THE IRON TRADE REVIEW

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BUYING OF BASIC

ADDS TO INTEREST IN THE PIG IRON MARKET.

One Long Term Contract Made—Increase in Railroad Buying and Promise of More Business.

Some increase in buying of structural material by railroads and other interests, an unusual transaction in pig iron, and the promise of early ordering of steel rails and equipment by the Pennsylvania railroad have tended to relieve the monotony of an otherwise dull situation. It is hoped that the Pennsylvania system and the mills will not again have the difficulty experienced when the company offered to buy a large tonnage of rails for this year's use. It will be remembered that owing to the failure to agree on specifications, the company has taken no rails for use this year.

Basic Pig Contract

The Pittsburg Steel Co., which has been endeavoring for some time to provide for its large requirements of basic pig iron, has made a contract covering a five year period, calling for about 350,000 tons of iron. It is understood that the price is to be determined by adding 7 per cent for profit to the actual cost of production, but that at no time is the price to exceed $17. The same company has also purchased 10,000 tons for use prior to the beginning of delivery on the long term contract Nov. 1. The United Steel Co., of Canton, O., has purchased from 6,000 to 12,000 tons of basic, but the terms are not announced. A large enameling concern has purchased 10,000 tons of basic for delivery at its Illinois plant, and 2,000 tons of basic have been sold at Philadelphia. A Columbus, O., concern has purchased 3,500 tons of malleable and charcoal iron. In nearly all centers, the demand for foundry grades is very limited. Foundries are, however, taking iron on old contracts very promptly. Purchases were made in a conservative way, and seem not to have exceeded requirements.

Railroad Buying

The Chicago & Northwestern is in the market for 24,000 tons of structural material for track elevation work. The St. Paul has placed another order for 2,500 cars, and has contracted with the Bettendorf Axle Co. for the steel under frames. The Bettendorf company will require 22,000 tons of structural steel for car work recently taken. Other railroad orders include 4,000 tons for a viaduct at Denver; 3,000 tons for bridge work, awarded by the New York Central to the Fort Pitt Bridge Co.; 4,000 tons for a bridge across the Mississippi, awarded to the McClintic Marshall Construction Co. The Illinois Central railroad will take for prompt shipment 25,000 tons of steel rails, on which shipment had been delayed.

Structural Material

Including the railroad work, about 65,000 tons of structural steel will soon be contracted for in Chicago. Among orders placed within a few days were 5,200 tons for the Ritz-Carlton hotel, New York City; 5,000 tons for the Emigrant Savings Bank, New York; 1,100 tons for the Empire office building, Birmingham; 1,000 tons for a San Antonio hotel; 3,000 tons for a new lake freighter. On other finished materials, the demand is only moderate, although specifications are for the most part coming in satisfactorily.

FOREIGN LESSONS

BROUGHT HOME TO MACHINE TOOL MAKERS.

Valuable Results of Government Investigation — Annual Convention of the Association in New York.

The seventh annual convention of the National Machine Tool Builders' Association opened at the Hotel Imperial, New York City, Oct. 20, with an attendance of over sixty members. The initial session was featured by an address delivered by Captain G. L. Carden, United States Revenue Cutter Service, "A Review of the Department of Commerce and Labor's Report on the Condition of the Machine Tool Industry in Continental Europe." Capt. Carden was detailed to duty for the department of commerce and labor and was engaged as a special agent on this work. He recently spent six months abroad. This duty involved reports both in the relative merits of foreign and American machine tools, and methods in vogue in many of the important plants of western Europe. This service was performed for the bureau of manufactures of the department of commerce and labor, and the reports of Captain Carden were published in the Daily Consular and Trade Reports as issued by that bureau. Capt. Carden said in part:

In the manufacture of high grade machine tools during the past decade and a half America has undoubtedly led the world. This superlative of excellence has been reached chiefly because our manufacturers have been able to specialize on a few tools or even, in exceptional cases, on a single tool. Few European shops are able to specialize, one French manufacturer turning out 152 designs of machine tools.

Conditions in the trade in America have been so favorable that our manufacturers have not had reason to acquaint themselves with the situation abroad. For instance, they have not given the German credit for learning and developing; they have not learned, in many instances, the destination point or intended use of their machines shipped to the continent. The extent of the German machine tool trade is shown by the fact that during the fiscal year 1907 the machine tool sources

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THE WEEK IN IRON CENTERS

PITTSBURG.

Important Contract For Basic—Production Shows Little Change.

Office of THE IRON TRADE REVIEW,
510 Park Bldg., Oct. 20.

The drifting state of the iron and steel market is yet in evidence, but with the close of the presidential compaign less than two weeks distant, this is not surprising. While it is not being clearly shown that there is any disposition to discount the probable consequences involved in the choice of candidates and platforms, the trade is manifesting an expected interest in the outcome, and in some respects is undoubtedly temporarily deferring buying. If the result of the election is to work any direct effect upon the market, that will soon be known, but no immediate bearing in the improvement of conditions is anticipated from such a source. It is felt, however, that the situation will be clarified.

Where low prices are attractive and the more sanguine consumers are displaying confidence in the developments of the next several months, there is some renewal of buying in pig iron. The Pittsburg district is exhibiting some signs of such a movement this week and a large steel interest has closed for half of its requirements of basic for a term of five years, involving between 300 000 and 360,000 tons of metal.

Furnace and mill operations are showing little improvement. The Carnegie Steel Co. continues to operate 30 of its 55 furnaces; the National Tube Co. six of its 11 furnaces; the Jones & Laughlin Steel Co. five of six furnaces and the Republic Iron & Steel Co. four mill furnaces in the north, three Hazelton and one Hall in addition to two merchant stacks in the south, out of nine furnaces. A shortage of water has prevented the blowing in of the Hannah stack of this company, and the blowing out for repairs of one of the Hazelton furnaces. Mill operations range from approximately 35 per cent in rails to 70 per cent in wire products and merchant pipe. The drouth in the coke regions has not been relieved and is still severe.

Pig Iron.—A considerable degree of renewed life has been injected into the pig iron situation in this district during the past week or 10 days, and both sales and inquiry have materially increased. The greater activity is generally attributed to the belief among melters that prices are now near the bottom point and to the filling of regular requirements for the last quarter by that class of consumers which has discounted any probable effect of the election at hand.

Interest in well-informed circles has centered in the action of the Pittsburg Steel Co. in closing this week with the Canal Dover, O., interest for part of its requirements of basic iron for five years, beginning Nov. 1. The transaction calls for 6,000 tons mnothly, and the price is said to be fixed at 7 per cent over the actual cost of producing the iron, a maximum price of $17 being specified which the figure of settlement per ton is never to exceed. The iron involved is about one-half the full requirements of the company over such a term of years. It is reported that the contract for the remainder of the requirements for five years was offered another interest, but refused. The same steel company has also taken 10,000 tons of basic for prompt shipment, 500 tons daily, from a valley interest, to cover its needs up to the time the extended contract begins to run.

Basic iron has weakened, a local steel company having taken several thousand tons at about $14 valley. The market now appears upon this basis, but it is reported that this figure can be shaded. The United Steel Co., Canton, O., has informed sellers that it has closed on its inquiry of 6,000 to 12,000 tons of basic for first half. Bessemer iron remains quiet. The stocks of basic and Bessemer in the valleys are now about 66,000 tons.

Foundry and forge are selling more readily. One interest announces sales within the past few days of over 8,000 tons, including 3,000 of No. 3 at about $14 furnace, 1,800 tons of No. 2 in lots of 600, 300, 250, 250, 200 and 200 tons respectively, and 3,000 tons of gray forge, 2,000 to one company and 1,000 to another, in addition to an assortment of special irons. The No. 2 iron went at about the present market level of $14.25 to $14.50 furnace. Most of this iron will come to Pittsburg on last quarter delivery. Another seller disposed of 8,000 tons in different grades within the week.

The principal inquiry now in the market is from a foundry and machine company in this district for 1,500 tons of Bessemer, 2,400 tons of low phosphorus, 600 tons of high manganese foundry and 300 tons of ferro-silicon for delivery up to July 1.

Southern makers are holding to $13 Birmingham for No. 2 for delivery over the remainder of the year. Two of the large merchant interests announced this week that they had opened their books for first quarter business at $13 Birmingham for No. 2.

The Midland Steel Co. blew in its furnace, Oct. 19 on foundry after an idleness of a number of months. For prompt and last quarter shipment on northern iron, we quote as follows:

Bessemer, valley	$15.00 to 15.25
Bessemer, Pittsburg	15.90 to 16.15
No. 1 foundry, Pittsburg	15.60 to 16.10
No. 2 foundry, Pittsburg	15.25 to 15.50
Gray forge, Pittsburg	14.25 to 14.50
Basic, valley	14.00 to 14.25
Basic, Pittsburg	14.90 to 15.15

Ferro-Alloys.—The demand for ferro-alloys is showing some increase and the market is holding firm at quoted prices. An Ohio steel interest has closed on its inquiry for 500 tons of ferro-manganese for first quarter, at a price reported to be above $43 seaboard. An inquiry for 100 tons of ferro-manganese for November and December from this territory is out, and also an inquiry for 300 tons of ferro-silicon for next year's delivery. We quote ferro-manganese at from $42.50 to $43.50 Baltimore, or $44.45 to $45.45 Pittsburg for delivery this year.

Imported 50 per cent ferro-silicon is quoted $67 Pittsburg on forward deliveries; domestic 12 per cent, $28; 11 per cent, $27; 10 per cent, $26. These quotations are applicable to Pittsburg territory. Imported lower grades of ferro-silicon are on about the same basis.

Plates.—New business in plates is of very moderate volume, and specifications against contracts represent the principal activity in the market. The Standard Steel Car Co. has already filed specifications with the Illinois Steel Co. for the 12,000 tons of plain material required in the construction of 1,000 steel cars for the Chicago & Alton railroad. There is considerable shading in plate prices, but this does not appear any more general than it has been. We quote:

Tank plates, ¼-inch thick, 6¼ to 100 inches, 1.60c f. o. b. mill Pittsburg. Extras are as follows per 100 pounds: Boiler and flange steel plates, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c. Plates in widths over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over

130 inches, 1c. Gages under ¼-inch to and including 3/16-inch plate on thin edges, 0.10c; under 3/16 to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets. — The market is moving evenly at present and is not showing any marked gains. Little evidence of jobbers taking tonnage for stocking purposes is now apparent, but this class of buyers is specifying more freely. Corrugated sheets are in demand and one inquiry for 70 tons for delivery in this district is now before sellers. The leading interest is working at about 55 per cent of capacity, but some of the independents have very full schedules. There is a good deal of shading in sheet prices, particularly on galvanized, and the cut ranges from $1 to $3. We quote:

Black steel sheets, cold rolled, No. 28 gage, $2.50 per 100 pounds, and galvanized sheets, No. 28 gage, $3.55 per 100 pounds, plus the regular extras.

Blue annealed: Nos. 11-12, 1.85c; Nos. 13-14, 1.90c; Nos. 15-16, 2c. Corrugated roofing, $1.75 per square for No. 28 painted, 2½-inch corrugation; and $3.10 per square on galvanized roofing, 2½-inch corrugation, No. 28.

Jobbers are allowed $1 a ton from these prices.

Tin Plate.—The better demand for tin plate from the enameled ware trade and in a less degree from the packers, has afforded some improvement in this market. The American Sheet & Tin Plate Co. increased its operations this week by putting on five additional mills at its Shenango plant, making 25 of the 30 mills of this works now in operation. We quote:

Coke tin plate, 100-pound basis, 14 x 20, $3.70 f. o. b. mill Pittsburg district. Terms, 30 days, less 2 per cent for cash in 10 days.

Rails and Track Material.—Although estimates of rail requirements for 1909 have been fixed by a number of the leading systems and specifications generally decided upon, there are no clearer prospects when the railroads will enter the market. Some specifications on standard rail contracts are being received by the local maker, and a steady volume of light rail business is being booked, but this is not sufficient to keep the rail mills at the Edgar Thomson works in steady operation. The rerolling mills are still active competitors with the new rail makers for light rail business, and this situation continues to bring out low prices. There is a little freer demand for railroad spikes in larger assortments, and a sale of 1,000 kegs this week is reported. On present specifications on Bessemer rails we quote as follows:

Fifty-pound and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; 8-pound, $36; 12-pound, $32; 16-pound, $30; 20-pound, $29; 25 to 45-pound, $28: angle splice bars for standard sections, $1.65; standard spikes, $1.70 to $1.80 Pittsburg; hand spikes, $1.80 to $1.90 Pittsburg.

Steel.—A fair run of specifications against billet contracts is being received, but new business is of the small order variety. Billets are moving better than sheets and tin bars. There is a good demand for sheet bar crop ends.

Bessemer and open-hearth billets, base sizes, are quoted at $25 Pittsburg, and forging billets at $27 Pittsburg, subject to the division of the freight charge over $1 and not exceeding $3, and sheet and tin bars at $27.50 Pittsburg, valley and Wheeling territory, and $27 Pittsburg for delivery to other points.

Hoops, Bands and Cotton Ties.—Little business is now being placed in hoops and bands, and specifications against contracts are only in fair volume. We quote:

Cotton ties, 87½c per bundle Pittsburg, plus the freight on lots of 3,000 bundles or more, and 90½c per bundle Pittsburg for less than 3,000 bundle lots.

Hoops in carload lots, 1.80c; in less than carload lots, 1.90c; bands, 1.40c, base half extras as per standard steel.

Merchant Bars.—Conditions with different makers of steel bars are varied according to the class of consumers which they have upon their books. The implement manufacturers generally are specifying fairly well, but the car companies, nut and bolt manufacturers and other large users are not active with their orders to mills. Some steel bar makers accordingly report an improved volume of business this month, while others have suffered a decline in specifications. Bar iron prices are being better maintained at present than for several years past. The demand is somewhat better, the railroads buying in a limited way. Shafting prices are firmer, and business booked in October by some of the leading makers shows a decided increase over other months of the year. We quote:

Common iron bars, 1.40c Pittsburg in carload lots and over; 1.45c in less than carloads; 1.32c to 1.35c base Pittsburg plus freight to point of shipment on western deliveries; Bessemer and open-hearth steel bars, 1.40c; plow and cultivator, 1.40c; channels, angles, zees, tees, under 3 inch, 1.50c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size, 0.30c advance. Cold rolled and ground shafting 57 per cent in carloads, and 52 per cent less than carloads, delivered in base territory; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flats, 1.60c to 1.65c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.10c to 2.15c. Planished and machine straightened tire steel is 1.60c base. Iron finished tire under 1½ by ½ inches, 1.55, plus ½ extras on tire card; iron finished tire, 1½ by ½ and over, 1.40c, plus ½ extra on the steel bar card.

On cold rolled strip steel, width 1½ inches and wider, and 0.100 inch thicker, we quote base prices per 100 pounds, $3.35 on hard, and $3.60 on soft.

Structural Material. — While inquiries appear a little more plentiful from the source of railroad bridge work and commercial construction, conditions in structural lines manifest little improvement. Much of the railroad work is that which has been in contemplation for some time, and genuinely new projects are limited. Fabricating competition continues keen, and determined efforts are being made to bring the market back to a normal basis. The Chicago & Northwestern railway has asked for bids on extensive elevated track improvements in the city of Chicago, which will involve about 25,000 tons. The bidding will close within the next week. The McClintic-Marshall Construction Co. this week was awarded the Iowa Central bridge across the Mississippi river at Keithsburg, Ill., 4,000 tons. The Pittsburg Bridge & Iron Co. will erect three buildings for the Berger Mfg. Co., Canton, O., 300 tons, and has also taken a building at Mansfield, O., 125 tons, and a crane runway at Erie, Pa., 100 tons. We quote:

Beams and channels, 15-inch and under, 1.60c; over 15 inches, 1.70c; zees, 1.60c; tees, 1.65c; angles from 3 to 6 inches, 1.60c; over 6 inches, 1.70c; universal and sheared plates, 6¼ inches and wider, 1.60c base.

Merchant Pipe.—The trade in merchant pipe is holding up strongly and current bookings are favorable. Jobbers, however, are not specifying freely for store purposes and stocks are being kept well assorted. As cold weather is approaching, the call for oil and gas field goods is less. Among the sales of the week, were four miles of 5-inch

iron line pipe for Chicora, Pa., delivery, three miles of 3-inch to a local light and heat company and 11 miles of small line pipe in several orders for delivery to different western points. The inquiry of the Ohio Fuel Supply Co. for 25 miles of 8¼-inch mentioned as disposed of last week, was closed by the company relaying 15 miles and buying 10 miles in the market. Prices on steel pipe are firm and there are fewer reports of shading in iron pipe. We quote the following official base discounts with an additional one point and five off to jobers:

	—Steel—		—Iron—	
	Black.	Galv.	Black.	Galv.
¼ to 6 inches....	75	65	73	63

Boiler Tubes.—Owing to the limited amount of power construction under way in the country, the present boiler tube market is not active, and prospects for the future have not improved. The railroads continue to buy for maintenance only. We quote the following official base discounts to the general trade on base sizes:

BOILER TUBES.

	Iron.	Steel.
2¼ to 5 inches.....	52	65

Wire Products.—With the presidential election at hand, the situation in wire products reflects a conservative attitude on the part of buyers, but makers are anticipating some improvement with the settling of the issues at stake. Plain wire is not moving very briskly. Trade in woven wire fencing is reported to be equal to the corresponding period a year ago. The Youngstown Sheet & Tube Co. within a week or 10 days will be a seller of galvanized wire and galvanized barbed wire, having just about completed the installation of the machinery for this line of manufacture in its Struthers works. We quote:

Wire nails, jobbers' carload lots, $1.95; retailers' carload lots, $2; painted barb wire, jobbers' carload lots, $2.10; retailers' carload lots, $2.15c, with 30c for galvanizing; plain wire to jobbers in carloads, 1.80c; and to retailers in carloads, 1.85c.

Wire Rods.—Though there is some new buying, rod users in this territory have generally closed for their requirements and activity is by specifications. We quote $33 Pittsburg on Bessemer and $34 Pittsburg on open-hearth rods.

Coke.— A firmness in the price of furnace coke has continued until sellers under present conditions are asking $1.75 ovens for delivery this year. The drouth continues unrelieved in the operating regions and the situation is becoming more and more acute, particularly in Westmoreland county and in the Greensburg district. A continuation of the absence of heavy rainfall for 10 days or two weeks is expected to force many ovens out of blast or to the adoption of more heroic measures for obtaining water, as the present sources of supply are undergoing a severe drain. Some furnaces are buying for next year where operators are willing to sell at favorable prices, several eastern interests having closed this week at about $1.90 ovens. There is little furnace buying for next year in this territory, however, as sellers are asking higher prices. There is some foundry coke being regularly sold and shipments are fair. Prices into next year range from $2 to $2.25 ovens, but for first half delivery some interests are asking $2.35 ovens. Operations in the Connellsville regions for the week ending Oct. 10 showed the highest production of any week since that ending Feb. 1. This output has only been exceeded by two weeks in the present year. The *Courier* for the week ending Oct. 10 shows 18,252 ovens active, 19,309 inactive with an output of 201,713 tons against 18,496 ovens active, 18,990 inactive, and a production of 199,074 tons the preceding week.

Old Material.—With basic pig iron selling considerably under heavy melting steel, some steel makers are increasing the proportion of pig iron in their mixtures, at the expense of scrap. As a consequence, the consumption of heavy steel at present is less than might be expected, even under the unstable business conditions prevailing. Scrap consumers generally are awaiting lower prices, arguing that the present level is artificial owing to activity of the dealers in absorbing most of the offerings and holding them closely, except where they practically dictate their own terms. Trading as a whole is light. There has been some buying direct from the railroads by consumers, in competition with the dealers, and the result has usually been to bid beyond the market. Old car wheels are moving sluggishly owing to the inactivity of car builders. We quote as follows, gross tons, delivered in the Pittsburg district:

Heavy melting scrap, $14.50 to $15; re-rolling rails, $16 to $16.75; bundled sheet scrap, $12 to $12.50; iron axles, $21 to $21.50; old iron rails, $17 to $18; No. 1 wrought scrap, $16 to $16.50; old car wheels, $14.75 to $15.25; low phosphorus, $18 to $18.50; machine shop turnings, $10 to $10.50; cast borings, $9.25 to $9.75; No. 1 cast scrap, $14 to $14.50; malleable, $14 to $14.50.

CHICAGO.

Another Large Car Order—Heavy Structural Contracts Soon to be Let.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Block, Oct. 20.

The Chicago, Milwaukee & St. Paul railroad has ordered the building of another lot of 2,500 cars and has placed the order for the steel underframes, trucks and bolsters with the Bettendorf Axle Co. This brings the total up to 7,500 cars ordered within the last month. For this last order 10,000 tons of shapes will be required. The Chicago & Northwestern railroad has issued its drawings and is asking figures on 24,000 tons of steel for its terminal track elevation. This, with other structural tonnage pending, foots up a total of 65,000 tons of structural steel that will be let before the end of the year, probably within 15 days. The buying of equipment by the railroads also continues. The Chicago, Rock Island & Pacific is in the market for 60 locomotives, the Chicago, Milwaukee & St. Paul will place contracts this week for 50 Prairie type locomotives, the Chicago & Northwestern has ordered 25 ten wheel and 15 six wheel switch engines and 15 Atlantic type locomotives, the Chicago & Alton road will soon be in the market for 20 consolidation locomotives and ten other engines. The Illinois Central road has released for prompt shipment 25,000 tons of rails which it has under contract with the leading interest. Some of the foundries in this territory making railroad castings report October as a banner month, and coke sales to foundries are reported almost 90 per cent of normal, while investigation shows that the average stock of coke on the founders' yards is 57 tons, indicating that consumption is considerably heavier than generally supposed. Steer bar specifications during October have been much heavier than in September. Current sales of pig iron are comparatively light because most of the melters in this territory are well covered for the remainder of the year and are awaiting the result of the election before providing for their next year's needs. Whether or not the importance of the election is being exaggerated by manufacturers, it is certainly true that many business projects are, in the present belief of the projectors, contingent upon its results.

Pig Iron.—The most important occurrence of the week from the standpoint of local furnace interests was the incursion into this market of a Cleveland pig iron interest with a sale of 2,000 tons of malleable to the Belle

City Malleable Iron Co. of Racine, Wis. This was also the largest sale of the week. A southern interest sold between 500 and 1,000 tons of silvery iron and the Western Electric Co., ordinarily a buyer of southern iron, bought about 800 tons of northern iron running over 2½ per cent in silicon to be delivered during the rest of the year. A large number of inquiries covering pretty generally the partial needs of the buyers in this market for the first quarter are on file, one local interest reporting from 15,000 to 20,000 tons on which prices were asked. Just now this is almost entirely a testing of the market, but the fact remains that the major portion of the first quarter iron is still to be bought. Sales of about 900 tons in the northwest are reported and the iron will be made in Duluth. The Zenith furnace has been filled with coke and will be blown in this week with orders ahead of it for the remainder of the year. The second Mayville stack, which has been out for relining, will be blown in very shortly. Thomas furnace is still down, though ready to start at any time. The asking price for local iron, delivery during the remainder of the year is $16.50 furnace, and for the first quarter or first half, $17.00 for No. 2. Several hundred tons of southern foundry were sold in this market during the week in addition to the silvery iron. That for prompt shipment brought $12.50 Birmingham, and for next year $13.

Lake Superior charcoal	$19.50
Northern foundry No. 1	17.00 to 17.50
Northern foundry No. 2	16.50 to 17.00
Northern foundry No. 3	16.00 to 16.50
Southern foundry No. 1	17.35 to 17.85
Southern foundry No. 2	16.85 to 17.35
Southern foundry No. 3	16.35 to 16.85
Southern foundry No. 4	15.85 to 16.35
Southern No. 1 soft	17.35 to 17.85
Southern No. 2 soft	16.85 to 17.35
Southern gray forge	15.60 to 16.10
Southern mottled	15.35 to 15.60
Southern silveries, 4 per cent silicon	17.85 to 18.35
Southern silveries, 5 per cent silicon	18.35 to 18.85
Southern silveries, 6 per cent silicon	18.85 to 19.35
Jackson Co. silveries, 6 per cent.	19.90
Jackson Co. silveries, 8 per cent.	20.40 to 20.90
Jackson Co. silveries, 10 per cent	21.90
Malleable Bessemer	17.00 to 17.50
Standard Bessemer	17.65 to 18.15
Alabama Basic	16.85 to 17.35

Billets and Rods.—With the exception of a few orders for small lots of forging billets, there is practically no business in this line. Rods are moving on contracts in good volume and it is given out that the rod mills of the leading interest are operating actively. We quote 4 x 4 inch rolling billets, $26.50 and forging billets, $28.50 base Chicago. We quote f. o. b. Pittsburg Bessemer wire rods, $33; open-hearth, $35; chain rods, $33.

Merchant Steel.—All of the steel bar manufacturers report excellent specifications on contracts they have taken and in some instances original contracts have already been exceeded and additional contracts made. The mill of the Cambria Steel Co. is scheduled 30 days ahead and is advising customers to anticipate their requirements. The leading interest reports its steel bar tonnage for the first half of October in excess of the entire month of September. Bar iron is more quiet, but a certain amount of business is continually coming up. Mill activity is practically as reported for the past two weeks. The meeting of the National Association of Implement and Vehicle Manufacturers at Columbus, O., this week is attracting all of the western bar manufacturers. We quote for Chicago delivery as follows:

Bar iron, 1.50c to 1.53c; soft steel bars and bands, 1.58c, half extras; soft steel angles, less than 3 x 3 inches, 1.68c; hoops, 1.98c base, full extras; planished or smooth-finished tire steel, 1.78c; iron finish, up to 1½ x ½-inch, 1.73c base tire card; iron finish, 1½ x ½-inch and larger, 1.58c base steel card; channel for solid rubber tire, ¾ to 1-inch, 2.08c, and 1⅛-inch and larger, 1.98c; smooth finished machinery steel, 1.83c; flat sleigh shoe, 1.63c; concave and convex sleigh shoe, 1.83c; cutter shoe, 2.05c; toe calk steel, 2.13c; railway spring, 1.93c base steel card; vehicle spring steel, 1.98c base, vehicle card; crucible tool steel, 7c to 9c, with higher prices asked on special grades. Quotations on shafting are 56 per cent off the list for carload lots, and 52 per cent off for less than carload lots, carload freight allowed to points in base territory. On iron and steel bars from local stocks, we quote as follows: Bar iron, 1.90c to 2c, full extras; soft steel bars, 1.80c per 100 pounds base, plus half extras; soft steel hoops, 2.30c, full extras.

Plates.—No very important plate tonnages are reported for the past week, but specifications on contracts placed in the last few weeks are coming out in a very satisfactory way. Most of the smaller business is being taken by outside independent mills from whom more attractive prices can be obtained. The sheared plate mill at the South Works of the leading interest is down temporarily, but the universal mill is running steadily. We quote for Chicago delivery:

Plates, ¼-inch and heavier, 6¼ to 100 inches wide, either universal or sheared, 1.78c Chicago. For extras see Pittsburg report. Jobbers' prices for shipment from local stocks are as follows: Tank steel, ¼-inch and heavier, up to 72 inches wide, 2c to 2.10c; from 72 to 96 inches wide, 2.10c to 2.20c; 3/16-inch up to and including 60 inches wide, 2.10c to 2.15c; 72 inches wide, 2.35c to 2.45c; No. 8, up to 60 inches wide, 2.10c to 2.15c. Flange and head quality, 25c extra.

Sheets.—The seasonal demand for sheets continues to support a good movement, especially in roofing and the lighter gages. Jobbers are buying fall stocks and a very fair business is coming from jobbers of the west and southwest. Local store prices are reported as quite firm, but it is well known that mill prices may be shaded without much difficulty. For mill prices see Pittsburg report. We quote for Chicago delivery from store as follows:

No. 10, 2.15c to 2.25c; No. 12, 2.20c to 2.30c; No. 14, 2.25c to 2.35c; No. 16, 2.35c to 2.45c; Nos. 18-20, 2.60c to 2.65c; Nos. 22-24, 2.65c to 2.70c; No. 26, 2.70c to 2.75c; No. 27, 2.75c to 2.80c; No. 28, 2.85c to 2.95c; No. 30, 3.25c. Galvanized sheets, No. 10 to 16, 3.05c to 3.10c; Nos. 18 to 20, 3.15c to 3.25c; Nos. 22 to 24, 3.30c to 3.35c; No. 26, 3.50c to 3.55c; No 27, 3.70c to 3.75c; No. 28, 3.90c to 4.00c; No. 30, 4.40c to 4.50c.

Structural Steel.—About 65,000 tons of structural steel is apparently just on the eve of placing in this territory. The Chicago, Milwaukee & St. Paul road ordered last week from the Bettendorf Axle Co. another lot of underframes, trucks and bolsters for 2,500 steel underframe cars of 40-ton capacity. This will make 7,500 cars ordered within the last month and 10,000 such cars within the last year ordered by this one road. Structural steel amounting to 22,000 tons has been ordered by the Bettendorf Axle Co., 12,000 tons from the leading interest and 10,000 tons from the Bethlehem Steel Co. for the 5,000 underframes recently placed and to fill this last contract the company will shortly contract for an additional 10,000 tons of structurals. The Chicago & Northwestern has sent out its inquiry for 24,000 tons, which constitutes the main portion of the terminal track elevation tonnage and it asks for figures Oct. 26. Deliveries on this material are to begin in February and extend over one year. The 4,200 tons on which bids have been in for three or four weeks has not been let. The final disposition of the McKinley bridge has not been announced. The John Pierce Co., general contractor, has let the contract for 2,000 tons of steel for the Carnegie library in St. Louis and the general contract for the Empire building in Birmingham amounting to 1,500 tons has been let to Contractor Thompson, of

that city. The Soo line has an inquiry out for about 200 tons. The American Bridge Co. took miscellaneous orders to the amount of about 800 tons. The local structural mill of the Illinois Steel Co. is well filled up on orders and specifications are heavy. Bids are being asked on 4,000 tons of steel for a viaduct on Twentieth street in Denver, Colo. It is to be built by the Union Pacific, Burlington, Colorado & Southern and Denver, Northwestern & Pacific railroads and the consulting engineer is H. S. Crocker, 434 Empire building, Denver. We quote as follows:

All angles, 3 inches and larger, including 6 inches, $1.95 per 100 pounds; angles over 6 inches, $2.05 per 100 pounds, base; beams, 3 to 15 inches, inclusive, $1.95 per 100 pounds, base; channels, 3 inches and larger, $1.95 per 100 pounds, base. Less than carload lots are $1 a ton higher than foregoing prices.

Rails and Track Supplies.—Rail road specifications on rails are very satisfactory. The 18,000 tons of rails ordered from the Tennessee Coal, Iron & Railroad Co., and the 7,000 tons ordered from the Illinois Steel Co., on which a suspension of shipment was asked by the Illinois Central railroad, have been released and will be taken out at once. A sale of 1,200 tons of light rails to a Louisiana lumber company is reported, which brings the total light rail sales for the month of October up to 3,000 tons. The Lackawanna Steel Co. sold the rail joints for 40 miles of track for the Ann Arbor railroad. Spikes and bolts are in brisk demand and specifications are crowding the mills. We quote:

Standard rails, $28 f. o. b. mill, full freight to destination; light rails, 25-pound to 45-pound, $26; 20-pound, $27; 16-pound, $28; 12-pound, $29. Track supplies, f. o. b. Joliet, angle bars, 1.50c to 1.60c; spikes, 1.80c to 1.90c; track bolts, with square nuts, 2.15c to 2.20c; with hexagon nuts, 2.25c to 2.35c. Small railroad and square boat spikes, 1.90c base, f. o. b. Chicago.

Merchant Pipe and Boiler Tubes.—The October tonnage of merchant pipe looks to be larger than for the corresponding period of September and the boiler tube business is distinctly better. Prices from store are without change and we qoute:

	—Steel— Black.	Galv.
¼ to 6 inches, inclusive.....	73.2	63.2
7 to 12 inches, inclusive.....	70.2	55.2

BOILER TUBES.

	Steel.	Iron.	less.
2¼ to 5 in., inclusive....	63.2	50.2	50.2

Cast Iron Pipe.—One of the largest pipe tonnages let in the west in many months is in prospect with the proposed building of a municipal water service plant at Helena, Mont. Bids have been asked on from 8,000 to 10,000 tons and figures will be received Oct. 29. Lettings for the coming week are small, being 300 tons at Ellinwood, Kas., and the same amount at Kirwin, Kas. The United States Cast Iron Pipe & Foundry Co. will furnish the 400 tons of pipe for LaCrosse, Wis. Prices are firmer. We quote 4-inch pipe, $27; 6 to 12-inch, $26; larger sizes, $25; gas pipe, $1 a ton higher.

Wire Products.—There is little of specific interest to report concerning this trade other than that it is very well sustained. Prices are firm and we quote:

Wire nails, jobbers' carload lots $1.95; retailers' carload lots, $2; painted barb wire, jobbers' carload lots, $2.10; retailers' carload lots, $2.15, with 30c for galvanizing; plain wire to jobbers in carloads, 1.80c; and to retailers in carloads, 1.85c.

Old Material.—A combination of circumstances last week which brought both a local consumer and an outside consumer of heavy melting steel into this market for a considerable tonnage resulted in some price advances and a general firming up of the market. There is little to mark any differences in actual market conditions, however, and the change simply indicates the extreme susceptibility of the market. We have revised our prices and quote gross tons in the first paragraph as follows:

Old car wheels	$15.25 to 15.75
Old iron rails	18.00 to 18.50
Re-rolling rails (4 ft. and over)	16.00 to 16.50
Old steel rails (4 ft. and under)	14.75 to 15.25
Light section relayers, 45 lbs. and under, subject to inspection	21.00 to 23.00
Relaying rails, subject to inspection	19.00 to 19.50
Frogs, switches and guards	14.00 to 14.50
Heavy melting steel	13.75 to 14.25

We quote, net tons, as follows:

No. 1 R. R. wrought	$13.50 to 14.00
No. 2 R. R. wrought	12.75 to 13.25
Knuckles, couplers and springs	13.00 to 13.50
Shafting	16.00 to 16.50
Iron car axles	19.50 to 20.00
Steel car axles	17.50 to 18.00
Dealers' forge No. 1	10.75 to 11.25
Pipes and flues	10.25 to 10.75
No. 1 cast, 150 lbs. and less	13.25 to 13.75
No. 1 mill	8.00 to 8.50
Mixed busheling (Nos. 1 and 2)	8.25 to 8.75
Country sheet	4.50 to 5.00
No. 1 boiler cut	8.50 to 9.00
Boiler punchings	11.50 to 12.00
Cast borings	6.00 to 6.50
Mixed borings, etc.	6.00 to 6.50
Machine shop turnings	7.25 to 7.75
Railroad malleable	12.50 to 13.00
Agricultural malleable	11.25 to 11.75
Stove plate and light cast scrap	11.75 to 12.25
Old iron splice bars	16.75 to 17.25

The Manitowoc Dry Dock Co., Manitowoc, Wis., has been awarded the contract for the construction of a steel lighter for the Chicago Lighterage Co., to cost $50,000.

CLEVELAND.

Large Tonnage of Basic Under Contract—Market Dull.

Office of THE IRON TRADE REVIEW,
Browning Building, Oct. 20.

Iron Ore.—Very few sales of ore have been made, and it is not expected that the market will show much improvement this year, although a few sales which have been held up will undoubtedly be effected if election results are favorable. The ore shipments will be larger after Nov. 3, if the political results are satisfactory to the shippers. It is certain, however, that some of the vessels now in commission will be sent to dock, as they are not able to obtain cargoes, and can not afford to depend upon uncertain eventualities in the political field.

On base ores, with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $4.50; Mesabi Bessemer, $4.25; old range non-Bessemer, $3.70; Mesabi non-Bessemer, $3.50.

Pig Iron.—It is said that a transaction involving a large tonnage of basic has been put through, but official confirmation is lacking. There has been some increase in inquiry for foundry grades, but the market has manifested a softening tendency. On No. 2 very near $14 has been done for prompt shipment, and $14.50 can be shaded for the first quarter of next year. We quote, f. o. b. Cleveland, as follows:

Bessemer	$15.90 to 16.15
No. 1 foundry	15.40 to 15.80
No. 2 foundry	15.25 to 15.50
No. 3 foundry	14.90 to 15.25
No 2 southern	16.35 to 16.85
Gray forge	14.00 to 14.50
Lake Superior charcoal	19.50 to 20.00
Jackson Co. 8 per cent silvery	20.05

Coke.—Foundries are promptly taking all the coke due on contracts, and their requirements seem to be fully up to the tonnage purchased, but there are very few new transactions. Ovens are still hampered by scarcity of water. We quote spot furnace coke $1.60 to $1.70, and on shipments over the remainder of the year $1.70 to $1.80. Foundry coke we quote at $2 to $2.25, for both prompt and forward delivery.

Finished Materials.—The contract for plates and shapes for the new freighter to be built for Rufus P. Ranney by the Toledo Ship Building Co. has been awarded to the Carnegie Steel Co., the tonnage being about 3,000. Specifications against contracts on nearly all materials have

been coming in freely, and there is a very fair amount of new business for sheets, sheet bars, and steel bars. The price of bar iron is so low, considering the high price of old material, that mills are not very active in seeking orders, and seem to be content to turn out reduced output. Talk of postponement of orders pending the presidential election is frequently heard.

Old Material.—The movement of material continues sluggish, and mills are buying scantily, still in line with their operations. The railroads, at least in lists that have been placed within the past several weeks, have been getting fairly good prices or have refused to sell. Except for an increase of 50 cents a ton in malleable iron, there have been no changes in prices the past week. All in all, however, possibly because of renewed activity on the part of yard owners desirous of moving stock but not at any sacrifice in prices, the market shows signs of a rising tendency. We quote, f. o. b. Cleveland, as follows:

Old iron rails	$16.50 to 17.00
Old steel rails (re-rolling)	15.00 to 15.50
Old steel rails (under 6 ft.)	15.00 to 15.50
Old car wheels	15.00 to 15.50
Old steel boiler plate	12.50 to 13.00
Steel axles	18.50 to 19.00
Malleable iron (railroad)	13.50 to 14.00
Malleable iron (agricultural)	12.00 to 12.50
Heavy steeel	13.75 to 14.25
Country mixed steel	12.00 to 12.50
Low phosphorus	16.00 to 16.50

We quote net tons as follows:

No. 1 R. R. wrought	13.50 to 14.00
No. 1 busheling	12.00 to 12.50
No. 1 machine cast	12.00 to 13.00
Iron axles	17.00 to 18.00
Axle turnings	9.50 to 10.00
Machine shop turnings	7.50 to 8.00
Grate bars	11.00 to 11.50
Pipes and flues	11.00 to 11.50
Tank iron	11.00 to 11.50
Hoop and band iron	8.00 to 8.50
Sheet iron	6.00 to 6.50
Wrought drillings	7.50 to 8.00
Stove plate	11.00 to 11.50
Cast borings	7.00 to 7.50

CINCINNATI.

A Few Large Transactions, But Market in General is Still Quiet.

Office of THE IRON TRADE REVIEW, First National Bank Bldg., Oct. 20.

Pig Iron.—Larger inquiries and sales are represented in the week's developments, but the general demand and interest on the part of buyers continues to lag and aside from the important transactions under consideration, the market is quiet. Small tonnages and carload sales are not frequent and in this immediate territory pig iron business appears to be in a waiting situation on the part of both buyers and sellers until after the election. It is reported here that a Central Ohio melter is closing up or has closed for about 4,500 tons of pig iron for delivery in the first half of next year. Two thousand tons of this purchase was charcoal iron of malleable specification, but the price was not made public; the same melter also bought 3,500 tons of malleable at about $14.75 Ironton, but the order was divided among three furnaces. A sale of 2,500 tons of southern charcoal, to go into carwheels for deliveries extending from October to April, at a shade under $20 Birmingham, has been reported. A melter in central western territory bought 2,000 tons of southern foundry, No. 2, No. 3, and No. 4 for October-November delivery. A cast-iron pipe manufacturer closed for 500 tons Virginia iron. A sale of 200 tons of gray forge at $11 Birmingham for prompt shipment is reported. A few small lots of Jackson county silvery 8 per cent silicon have been sold at $18.50 furnace. An Ohio melter bought 1,000 tons of basic for November delivery; and a St. Louis consumer took something over 1,000 tons of basic for the next five months' delivery. An inquiry from a northern melter for 1,500 tons of southern foundry is under consideration. A consumer in Pittsburg territory is figuring on about 4,000 tons of special iron; and in northern Ohio an inquiry for 12,000 tons of basic for first half delivery is said to have been closed, but the sale was not made through this market, and this is not confirmed. It is noticeable that inquiries recently made more frequently result in buying than six weeks ago and are therefore considered more seriously. Prices remain unchanged, and while $12.50 Birmingham has been shaded on some large business, it is difficult to locate a furnace company that is willing to accept anything less than this figure and some of the leading producers continue to demand $13.00. In southern Ohio $14.75 Ironton is still minimum, with furnaces in that territory apparently content to hold out against further concessions, as they are booking but little business. We quote for prompt shipment and delivery over the remainder of the year, delivered Cincinnati, based on freight rates of $3.25 from Birmingham and $1.20 from Ironton as follows:

Southern foundry No. 1	$16.25 to 16.75
Southern foundry No. 2	15.75 to 16.25
Southern foundry No. 3	15.25 to 15.75
Southern foundry No. 4	14.75 to 15.25
Southern No. 1 soft	16.25 to 16.75
Southern No. 2 soft	15.75 to 16.25
Southern gray forge	14.25 to 14.50
Northern No. 1 foundry	16.45 to 16.95
Northern No. 2 foundry	15.95 to 16.20
Northern No. 3 foundry	15.45 to 15.70
Northern 8 per cent silicon	19.70

Finished Material.—The specifications on contracts have been fairly good the past week and some large interests report orders equal to the first half of September. Jobbing trade has been only fair and new mill business light. Small orders are filled here at the following quotations:

Iron and steel bars, 1.85c to 2c, full extras. Angles, 3 x 3 and over, 2.10c to 2.25c; beams and channels, 15 inches and under, 2.10c to 2.25c; small angles and architectural channels, 2c base; plates, ¼-inch and heavier, 2c; 3/16-inch, 2.10c; No. 8, 2.15c; sheets, blue annealed, No. 10, 2.15c to 2.25c; No. 12, 2.20c to 2.30c; No. 14, 2.25c to 2.35c; No. 16, 2.35c to 2.45c; box annealed sheets, Nos. 18 and 20, 2.55c to 2.65c; Nos. 22 and 24, 2.65c to 2.75c; Nos. 25 and 26, 2.70c to 2.80c; No. 27, 2.75c to 2.85c; and No. 28, 2.85c to 2.95c; boiler tubes, 2¾ to 5 inches, 62 per cent off base; turn-buckles, 45 per cent off, rivets, 3c base; cold rolled shafting, 47 to 50 per cent off list; steel tire, 2.05c to 2.10c base.

Coke.—The market is featureless, as there are no contracts under consideration and shipments on old contracts are about the same as they have been for the past month. There is an ample supply to accommodate the little prompt shipment business coming up and prices remain without change. Consumers apparently show no disposition to stock coke against probable irregularities in transportation during the winter. Quotations in the leading coke producing districts are as follows:

	PER TON.
Wise county furnace coke	$1.75 to 1.85
Wise county foundry coke	2.10 to 2.25
Pocahontas furnace coke	1.60 to 1.75
Pocahontas foundry coke	2.00 to 2.25
Standard Connellsville furnace coke	1.75 to 1.80
Standard Connellsville foundry coke	2.00 to 2.25
Connellsville district furnace coke	1.60 to 1.65
Connellsville district foundry coke	2.00 to 2.25

Old Material.— While melters are not taking scrap freely or buying, dealers continue to hold firmly and prices are well maintained. Offerings from first hands are not large and the market is inactive. We quote dealers' prices, f. o. b. Cincinnati:

Old No. 1 R. R. wrought, net tons	$13.00 to 13.50
No. 1 machinery, net tons	13.50 to 14.00
Old iron rails, gross tons	15.00 to 16.00
Old steel rails (re-rolling) gross tons	15.50 to 16.00
Old short lengths, gross tons	14.50 to 15.00
Old iron axles, net tons	17.00 to 18.00
Heavy melting scrap, gross tons	13.00 to 13.50
Stove plate, net tons	10.00 to 10.50
Wrought turnings	6.00 to 7.00
Cast borings, net tons	4.50 to 5.00
Car wheels, gross tons	14.00 to 14.50

No. 4 stack of the Ohio works of the Carnegie Steel Co. was blown out Oct. 10 for relining.

NEW YORK.

Some Good Structural Contracts Awarded—Others Pending.

Office of THE IRON TRADE REVIEW, Room 1005, No. 90 West St., Oct. 20.

Pig Iron.—In spite of the excitement aroused by the approaching elections, the pig iron trade continues to show a moderate degree of activity, particularly in basic for eastern Pennsylvania plants and in foundry, for which several large manufacturers have been sounding the market for their early 1909 requirements. There has also been a brisk demand for small lots on quick delivery, indicating an appreciable increase in melt. One of the most important tonnages closed during the past few days was a 10,000-ton lot of basic for the Illinois plant of a large enameling concern, southern iron being largely purchased at a price understood to be about $13, Birmingham. A lot of 2,500 tons for an eastern electrical concern was placed for delivery running into the new year. Several fair sized inquiries are pending and it appears that a good volume of buying should follow the elections. Prices are being held firm by most producers, though one or two interests are making concessions to fill up their books. We quote, last quarter delivery, New York tidewater delivery, as follows:

Northern foundry No. 1	$17.00 to 17.50
No. 2X foundry	16.50 to 17.00
No. 2 plain	15.75 to 16.25
No. 2 southern foundry	16.75 to 17.25
Malleable	17.00 to 17.50
Basic	15.75 to 16.25
Gray forge	15.50 to 16.00

Ferro-Alloys.—Ferro-manganese has been increasingly firm at $43, seaboard, 500 tons having been placed during the past week in one lot and about an equal amount being involved in pending inquiries. For extended shipment, $43.50 is being secured. There is also a neat busines going in ferro-silicon, some 150 tons having been sold during the week and probably 125 tons being under inquiry. Prices are without change.

Finished Materials.—The principal addition to structural steel prospective business during the week developed through the action of the Northwestern system in asking bids on about 24,000 tons of canopies, approaches and other steel work incidental to its new Chicago station. It is expected that this project will be rushed through, and that an early award will be made on the steel for the station proper; specifications on the latter have been changed from the original, which called for Bethlehem sections. Two large New York projects have been disposed of. The 5,200 tons of steel required for the Ritz-Carlton hotel will be fabricated by Levering & Garrigues, of New York; although Eastern Steel Co. product is not specified, as has been reported, that company will probably furnish the shapes, and the Lackawanna Steel Co. the plates. The steel contract for the Emigrant Savings Bank, 5,000 tons, has gone to Post & McCord, and the trade expects the material to be furnished by the American Bridge Co. This company has finally entered on its books over 10,000 tons of the steel for the Oliver building. L. F. Shoemarker & Co. will supply the steel for the Jersey Central pier shed, 350 tons, securing the contract over 17 bidders. The Lehigh Valley pier shed has also been let. F. T. Nesbitt & Co. are low bidders on the general contract for a 600-ton addition to the Suffolk county court house, Boston. The general contract for the 16-story Empire office building in Birmingham, involving 1,100 tons of steel, went to T. C. Thompson & Co., of that city; and Bethlehem shapes are specified on a 1,000-ton hotel at San Antonio, Tex., the steel work of which went to the McClintic-Marshall Construction Co., over 14 bidders. This interest also took the second section of the New York Central station in New York, 1,500 tons, and a third section is on the market. Bids have gone in on a factory at Corning, N. Y., requiring 2,000 tons; a New York brewery project will require 500 tons and a new building for the Stock Quotation Telegraph Co., New York, 850 tons. The New York Central let its Buffalo bridge contract, 3,060 tons, to the Fort Pitt Bridge Co., and the Sinclair-Rooney building, 300 tons, went to the Buffalo Structural Steel Co. Other lettings include foundry for the Standard Sanitary Mfg. Co., Brighton, Pa., 600 tons, to the Pennsylvania Bridge Co.; a 700-ton bridge on the St. Paul to the Wisconsin Bridge Co.; a 600-ton stone crusher for Gary, Ind., to the Kenwood Bridge Co., and 900 tons of highway bridges at Ottawa, Can. The Hoyt apartments and the Cincinnati viaduct are still pending.

There is little activity in other lines, though plate prices seem a bit more firm. A fair volume of bar iron business is being done. We quote:

Angles, 3 to 6 inches x ¼-inch and heavier, 1.76c; beam, 3 to 15 inches, 1.76c; tees, 3 x ¼-inch and heavier, 1.81c; plates, carloads, tanks, 1.76c; marine boilers, 2.16c; bar iron, 1.41c to 1.51c; soft steel bars, 1.56c; sheets, No. 28, black, 2.66c.

Old Material.—The market is extremely dull, with mills buying little, though a vigorous attempt has been made to beat down the price of steel scrap, with some little effect. We quote gross tons, New York delivery, as follows:

Old iron rails	$17.50 to 18.00
Old steel rails, re-rolling	14.00 to 14.50
Relaying rails	20.50 to 21.50
Old car wheels	13.50 to 14.00
Old iron car axles	18.00 to 18.50
Old steel car axles	17.00 to 17.50
Heavy melting steel	12.00 to 12.50
No. 1 railroad wrought	15.00 to 15.50
Iron track scrap	12.50 to 13.00
Wrought pipe	10.50 to 11.00
Cast borings	8.00 to 8.50
Wrought turnings	9.00 to 9.50
Heavy cast scrap	13.00 to 13.50
Railroad malleable	13.00 to 13.50
Stove plate	10.50 to 11.00
Grate bars	10.50 to 11.00

PHILADELPHIA.

Pig Iron is Quiet—Effect of Tariff Revision Feared.

Office of THE IRON TRADE REVIEW, 408 Central Trust Bldg., Oct. 19.

Pig Iron.—Two thousand tons of basic have been sold for delivery this year at $16.00. Business is held in abeyance pending the election. The orders that are placed are mostly light tonnages in the foundry grades. Inquiry is said to be somewhat better. Prices remain about the same. They are not supported by present sales, however, but by the indifference of the furnace men towards taking any great tonnages at present figures. They quite generally expect an advance following the election, yet the diffidence of the buyers is said to be largely due to the fact that they, on the contrary, fear tariff revision may cause a reduction in the price of finished lines and that pig iron may sympathetically not only not be higher, but, perhaps, lower. Whereas at the beginning of the month the forward movement of iron was comparatively brisk, it now shows some slackness, said to be due to a slight slump in the foundry trade. Steel making grades are quieter. We quote as follows for delivery in buyers' yards, eastern Pennsylvania and surrounding territory:

No. 1X foundry	$17.25 to 17.75
No. 2X foundry	16.75 to 17.25
No. 2 plain	16.25 to 16.75
Standard gray forge	15.50 to 16.00
Basic	16.00 to 16.50
Low phosphorus	21.00 to 21.50
No. 2 Birmingham	17.25 to 17.75
No. 2X Virginia	17.00 to 17.25
No. 2 plain Virginia	16.50 to 16.75

Finished Materials.—The market is quiet and seems to wait upon the election. We quote as follows: Plates, 1.75c to 1.80c; structural, 1.75c to 1.90c; refined iron bars, 1.45c to 1.50c; steel bars, 1.55c.

Old Material.—The market is comparatively quiet, though there has been some buying by the steel com-

panies in the past few days. We quote as follows:

Old steel rails (re-rolling)	$16.50 to 17.00
No. 1 steel scrap	15.00 to 15.50
Old steel axles	21.00 to 22.00
Old iron axles	22.50 to 23.50
Old iron rails	19.00 to 19.50
Old car wheels	15.25 to 15.75
Choice scrap R. R. No. 1 wrought	18.25 to 18.75
No. 1 yard scrap	16.00 to 17.00
Machinery scrap	15.00 to 15.50
Low phosphorus scrap	18.50 to 19.00
Wrought iron pipe	14.00 to 14.50
No. 1 forge fire scrap	13.00 to 13.50
No. 2 forge fire scrap, ordinary	9.00 to 10.00
Wrought turnings	12.00 to 12.50
Axle turnings, heavy	12.75 to 13.25
Cast borings	11.50 to 12.00
Stove plates	13.00 to 13.50

ST. LOUIS.

Very Few Transactions in Pig Iron and Those for Small Lots.

Oct. 19.

Pig Iron.—Very little was done in pig iron business in the St. Louis territory last week. Most of the sales were for car lots of 100 tons for shipment over the remainder of this year. Very few orders were placed for shipment next year, with the exception of some Ohio iron taken for delivery over the first three months of 1909, aggregating 600 to 700 tons. Prices of southern iron are firm at $12.50 to $13, Birmingham, the lower price for immediate shipment and the higher one for delivery on future contracts. Some of the furnaces are sold up for the year and others are holding for the $13 price. While southern No. 2 is held at $13, Birmingham, it is rumored that one furnace is giving a differential in freight rates.

Our prices, delivered, to which the freight of $3.75 from Birmingham has been added, follow.

No. 1 southern	$16.75 to 17.25
No. 2 southern	16.25 to 16.75
No. 3 southern	15.75 to 16.25
No. 4 southern	15.25 to 15.75

The inquiry for 3,000 tons of malleable Bessemer reported in THE IRON TRADE REVIEW of Oct. 15, has not been placed.

Coke.—The market for coke is good with a strong demand. Connellsville 72-hour foundry coke, best selected grade, is held at $2.25 to $2.75 a ton, ovens, the lower price for quick shipment and the higher one for contract delivery. The car supply is good, but the drouth in the Connellsville district has militated somewhat against quick shipments. Connellsville 48-hour furnace coke is quoted at $1.75 to $2, ovens, both for immediate and future shipment. Virginia and West Virginia best selected 72-hour foundry coke is quoted at $2.25 for prompt delivery and $2.50 on contract. The freight from the Connellsville and Virginia fields is $2.80 East St. Louis and St. Louis and $2.70 from the Virginia fields when shipment is destined beyond St. Louis.

Old Material.—The market is practically the same as regard prices, with an increased demand manifested. Our quotations follow:

Cast iron borings, free from foreign material, net ton	$ 6.00
Steel axle turnings, gross ton	12.25
Steel railroad axles, net ton	$17.50 to 18.50
Iron railroad axles, net ton	19.00 to 20.00
Miscellaneous steel scrap, gross ton	12.25
Old car wheels, gross ton	15.00 to 16.00
No. 1 railroad cast scrap, net ton	12.00 to 12.50
Heavy machinery cast, net ton	13.00
Stove plate and light cast, net ton	11.50
Sheet iron, net tons, uncut	5.00
No. 1 railroad wrought, net ton	12.00 to 13.00
Railroad malleable, net ton	11.50
Heavy melting steel, net ton	11.50

BUFFALO.

Very Little Activity in Pig Iron—Building Prospects.

Office of THE IRON TRADE REVIEW, 932 Ellicott Square, Oct. 20.

Pig Iron.—The buyer and producer are pretty generally inactive this week, the cause being generally assigned to election sensitiveness and the indifference at furnaces to sell at present prices. Inquiries keep up, but for the past week they have been for small tonnage. Large inquiries have been conspicuously absent. At furnaces most of the activity is found in delivery on old iron. Quite a number of industries are now calling for iron on old contracts, this being taken as an indication that consumers are in need of pig to get out new work. In this connection a gradual, progressive improvement in conditions is found among the foundries and iron works of this section. No change in quotations can be fairly made at this time. We quote f. o. b. Buffalo as follows:

No. IX foundry	$16.00 to 16.50
No. 2X foundry	15.50 to 16.00
No. 2 plain	15.00 to 15.50
No. 3 foundry	15.00 to 15.50
Malleable Bessemer	16.00 to 17.30
Gray forge	14.75 to 15.25
Charcoal	20.25 to 20.75

Finished Products.—Business is undivided toward apathy in the finished material line and likely will continue so the remainder of the month. Some figuring is going on in a small way and a few unimportant contracts let. In Buffalo the past week the contract for furnishing steel to be used in erecting the Sinclair-Rooney Building, Washington street, was awarded the Buffalo Structural Co., Bethlehem sections to be used.

The Union Realty Co., which proposed the erection of a five-story office building in Syracuse, N. Y., has given the Jones & Laughlin Steel Co., the contract to supply the steel. In each case, about 500 tons was ordered.

BIRMINGHAM, ALA.

Very Little Business Being Transacted —No Change in Prices.

Oct. 19.

The waiting game is being played still by the pig iron consumers who deal with the southern producers. There is but little business being transacted just now and practically all the business that is being received is in very small lots, evidently for immediate use. There are steady shipments, however, being made from this territory on orders received some time ago and there is very little accumulation reported. Inquiries that are being heard of would indicate that as soon as the election is over there will be a big buying movement started and all the iron that can be possibly made or located in the district will be needed. The make in this section was improved some by the blowing in of one of the larger furnaces of the Alabama Consolidated Coal & Iron Co. Three other furnaces will be ready for operation before the end of the month. The rolling mills of the Tennessee Coal, Iron & Railroad Co. at Bessemer, south of here, are doing nicely again.

There has been positively no weakening on iron prices in this section, the manufacturers holding to $12.50 per ton, No. 2, as the minimum, and $13 per ton as the maximum.

SEATTLE.

Buying of Pig Iron is in Very Small Tonnages.

Office of THE IRON TRADE REVIEW, 302 Pioneer Bldg., Oct. 16.

Pig Iron.—Dullness characterizes the Pacific coast iron market. Some orders are being booked, but a great many of the sales are in driblets of one, five and ten-ton lots. Foundry stocks are gradually growing lower, but the foundry business at present is not in such shape as to encourage pig iron buying. Prices have not changed. We continue to quote:

English soft No. 1 spot	$26.50 to 27.00
English soft No. 1 to arrive Nov.-Dec.	24.00 to 24.50
Southern soft, No. 2	25.70 to 26.20

Old Material.—The market in rolled and wrought iron is still stagnant. Cast iron suitable for foundry remelting is showing some activity, but individual orders are small. There is strong tendency to hold off buying until the uncertainties of the election are settled. We continue to quote:

Foundry and machinery scrap	$16.00 to 18.00
Old steel rails	8.00 to 9.50
Railroad wrought	10.00 to 11.00
Glengarnock No. 1, spot	28.00 to 29.00
Country wrought and busheling	5.00 to 7.00

Merchant Iron.—The movement of

merchant iron and mild steel bars is the most encouraging feature at present in the Pacific coast situation. Jobbers are reporting a sustained volume of business with a slight but fairly steady increase. One Seattle interest has recently placed 100 tons in a single order with a number of scattering orders for lesser amounts. Rolling mills are running very light, but, if conditions remain as they are, will be able to increase their output within a few weeks. We continue to quote per 100 pounds f. o. b. Seattle: Common iron bars, $2.25; soft steel bars, $2.35; machinery steel, $2.75; Norway iron, $3.50; angles, channels, zees and tees, $2.75.

BRITISH IRON MARKET.

Firmness of Pig Iron Maintained—Effect of Eastern Crisis.

Office of THE IRON TRADE REVIEW, Prince's Chambers, Corporation St., Birmingham, Eng., Oct. 9.

The quarterly meeting this week has proved a useful test of the condition of the pig iron industry. All that can be said about it is that it maintains its recent condition of firmness without any change. The meeting at Birmingham produced scarcely any new business, but sellers managed to maintain prices, and their books are fairly full to the end of the year. This gives them a slight advantage, as coke is a shade easier. Makers of finished iron and steel find it impossible to get better prices, and this condition of things is handicapping the pig iron market. A good deal of stock has been sold from the South Staffordshire furnaces during the past week or two. In Cleveland the eastern crisis has to some extent depressed business. Considerable firmness is maintained, though stocks are slightly increased. There is now about 80,000 tons in stock. Prices have fallen slightly, transactions taking place at 49s 8d ($12.16) for one month, 49s 9d ($12.18) three months. Northampton iron continues at about 46s ($11.26) to 47s ($11.50). For foundry sorts there is a rather better demand, and the steel improvement has benefited hematite to some extent.

METAL MARKET

NEW YORK.

Oct. 20.

Copper.—While there is reason to believe that consumption is showing a fair increase, supplies on hand are taking care of immediate needs and purchasing is no more active. The market is dull, both at home and abroad, and prices continue without change. We quote. Lake, 13⅜c to 13⅝c; electrolytic, 13⅛c to 13⅜c; casting, 12⅞c to 13⅛c.

Pig Tin.—Pressure to sell on the London market forced a small decline and weakened the domestic market, trading on which has chiefly been among dealers. We quote 29c to 29¼c, New York, varying with delivery.

Pig Lead.—The tendency has been sharply downward, owing to the continued pressure to sell, and the current level is about 4.30c to 4.35c, New York.

Spelter.—In the face of an improved demand, the price has advanced and a fair volume of selling is reported at 4.77½c to 4.82½c, New York.

Antimony.—We quote: Cookson's, 8c to 8¼c; Hallett's, 7⅞c to 8⅛c; ordinary brands, 7½c to 7¾c.

CHICAGO.

Oct. 20.

The metal market continues very quiet with most of the business in small lots. An occasional order for important quantities is all that is offered. Lead is weaker, but prices of other metals are unchanged. We quote:

Lake copper, carload lots, 14c to 14½c; casting, carload lots, 13¾c to 14c; pig tin, 31½c to 32c; spelter, 4.85c to 5c; pig lead, desilverized, 4.35 to 4.50c in 50-ton lots; corroding, 4.75c to 4.85c in 50-ton lots; car lots, 2½c per 100 pounds higher; sheet zinc, 7c, list f. o. b. LaSalle in car lots of 600-pound flasks; Cookson's antimony, 10c to 10½c; other grades, 10c.

The variation in old metal prices is small and the volume of trading moderate. We have revised our prices and quote to dealers as follows:

Copper wire, 11½ to 12c; heavy copper, 11½c; light copper, 10½c; heavy red brass, 11c; heavy yellow brass, 8½c; light brass, 6½c; No. 1 red brass borings, 8½c; No. 1 yellow brass borings, 7½c; brass clippings, 8¼c; tea lead, 3¼c; lead scrap, 3⅝c; zinc, 3.10c; tin pipe, 23c; tin foil, 22c; pewter, 17c; electrotype plates, free from wood, 4c; electrotype dross, 2¾c; steretoype plates, 4¼c; stereotype dross, 2¾c; prime slab zinc dross, $55 per ton.

ST. LOUIS.

Oct. 19.

Lead and Zinc.—There was a decided slump in the prices of lead and zinc in the Joplin district last week. The prevailing price for 60 per cent jack was $36 and $36.50 per ton. A figure of from $34 to $35 a ton was realized on small quantities. Lead declined to $51 a ton, a very few lots bringing as high as $54. This was a decrease of $2 from the quotations that prevailed a week prior. The highest price quoted for zinc was $39. This was on an assay base price of $36 for 60 per cent ore, from Webb City. Silicate ruled weaker than it did for the previous week. The prevailing price for 40 per cent ore was from $17 to $19 a ton. The highest price reported was $25.50 on an assay base price of $19.

Producers throughout the entire district manifest a disposition to hold their output until after the presidential election, believing that conditions will then show a marked improvement. Smelters seemed to tend toward as small a production as possible, probably influenced by the same motives.

Lead and zinc plants are in operation to a greater extent than they have been for quite a number of months, but they are not selling the ore. The bins are rapidly filling up and there will be a large surplus to dispose of when the proper time comes to sell.

COLORADO FUEL & IRON ELECTION.

A special from Denver says that at the annual meeting of the Colorado Fuel & Iron Co. the following directors were elected: F. T. Gates, Edwin Hawley, J. H. McClement, S. J. Murphy, George J. Gould, E. H. Harriman, Willard P. Ward, E. T. Jeffreys, H. E. Cooper and L. M. Bowers, all of New York, and J. F. Welborn, D. C. Beaman and J. A. Writer, of Denver. L. M. Bowers was elected vice president and treasurer and chairman of the executive board. The following statement was issued:

"Stockholders have invited the Rockefeller interests to select men to direct the business because of their large financial investments and lively interest in the company's success. J. F. Welborn was re-elected president. The Colorado Fuel & Iron Co. will attend strictly to legitimate business without any entanglement whatever in affairs political."

The American Clay Machinery Co., Bucyrus, O., has begun operating its car department on a ten hour schedule, with work enough to keep the plant busy for the rest of the year. This department had been operating on half time.

MEETING OF NATIONAL MACHINE TOOL BUILDER'S ASSOCIATION.

(Continued from first page.)

of the Empire imported 9,106 complete tools, mostly of medium size, of which about 70 per cent came from America; on the other hand, German exportations numbered 52,553 complete machine tools, and practically as much more in the way of accessories and parts. Germany's largest customer during 1907 was Italy, which of all European countries is most ready to buy American tools.

American tools, in design, workmanship and accuracy of work, are as a rule better than those of foreign make. They are purchased because of superior merit, a fact which is recognized by the willingness of the German manufacturers to pay more in most cases, size for size, for the American than for the German tool. Whenever the foreign tool, however, approximates the efficiency of the American machine, the former is purchased.

It is technical education which is placing the manufacturing industry of Germany where it is today. From one great technical school, Charlottenberg, nearly 1,800 students are graduated yearly, and their graduates are absorbed by the great iron and steel and machinery firms. If the German could specialize as is possible in this country, he would soon be abreast of our designers.

The personal visit of American tool manufacturers to German manufacturing centers is needed. The directors of plants which are possible purchasers should be called upon. The methods of operating American machines should be made clear and their limits of efficiency explained.

Following Captain Carden's address a brief report supplementing and endorsing his remarks was made by J. B. Doan, of the American Tool Works Co., Cincinnati, who recently made a tour of the important European machinery and manufacturing centers. Both speakers were enthusiastically received.

President's Address.

In his address at the opening of the convention, President Fred C. Eberhardt of Gould & Eberhart, Newark, N. J., referred to "the various happenings in the financial market, coupled with the political situation, which has wrought havoc with business for the year."

In conclusion he submitted for the consideration of the members, the appointment or election of a committee on "Foreign Trade and Affairs."

He also suggested the appointment or election of a committee to study the subject with an idea of devising ways and means to minimize or prevent accidents in the machine shop.

Cost Accounting System.

The report of the secretary, P. E. Montanus, of the Springfield Machine Tool Co., Springfield, O., noted a membership of 91. Some 20 apprenticeship diplomas have been issued during the half year, at the request of 11 concerns. The feature of this report was the tabulation of replies from 76 members to letters asking whether or not they had adopted the uniform cost accounting system developed by Miller and Franklin, for the association. Two replied that they thought the charges excessive; two that their own system was in operation; seven that they might possibly modify their present arrangements along the lines suggested later on; five that they have in full operation a system embracing all the recommendations; one that it is inaugurating a new but different system; one that it has no system other than a general monthly average; 24 that they consider their present systems just as good and accurate; 13 that they have taken no steps to install the system; four that they have installed a cost system as outlined; four that they will adopt the system with modifications; eight that they will not adopt the system, preferring their own; two that they believe the most important item is for the association to adopt a certain per cent interest on investment and uniform discount on equipment; two that they will alter their systems when necessary; and two that they will install a system to fit their conditions.

Two new members were elected at the opening meeting; the Powell Tool Co., Worcester, Mass., and the Chas. G. Allen Co., Barry, Mass. The appointment of convention committees and reports of standing committees consumed the remainder of the morning, the afternoon being given over to executive meetings of the various special committees.

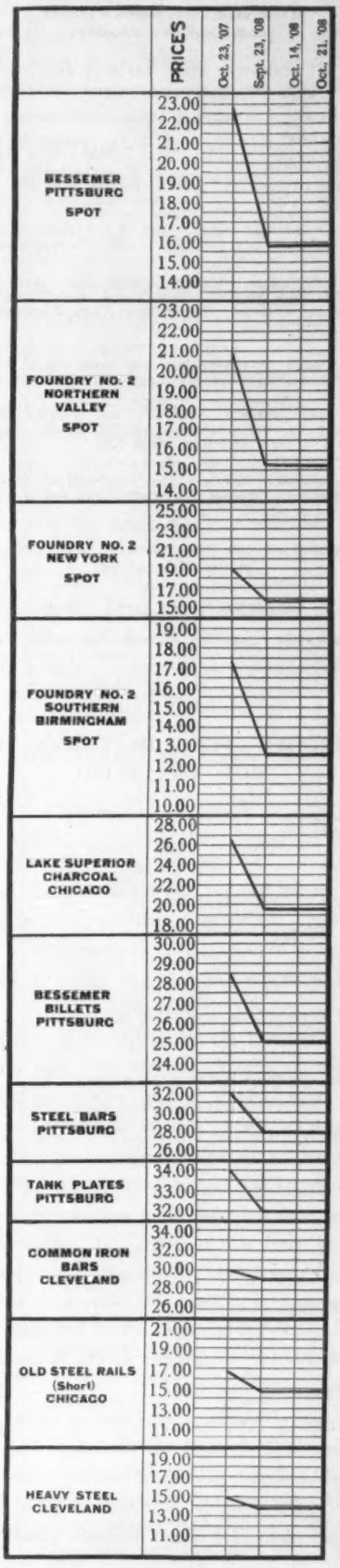
At the Wednesday morning session, a feature was the address of Harrington Emerson, president of the Emerson Co., 30 Church street, New York, on "Different Plans of Paying Employes."

NEW VICE PRESIDENT OF AMERICAN LOCOMOTIVE CO.

James McNaughton, manager of the Schenectady and Dunkirk plants of the American Locomotive Co., has been named vice president of the company in charge of sales, effective Oct. 15, to succeed R. J. Gross, who retired because of advancing years. He has already severed his connection with the Schenectady works, and will in future make his headquarters in New York. He has been succeeded by William L. Reid, who has been with him for a number of years as superintendent of the Schenectady plant.

Would Sell to Employes.—Intense interest has been aroused in the British industrial world by the proposals of Sir Richard Furness, M. P., chairman of the great ship building and engineering firm of Furness, Withy & Co., for the settlement of trade disputes without recourse to strikes or lockouts. He has offered to sell the ship yards to the workingmen, or to allow them to become members of a limited co-partnership. He has fixed Thursday, Nov. 26, as the limit date for an answer to his proposal. Trade unions of the country have received the proposal with by no means unanimous approval.

PRICE CHART.



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BRITISH FOREIGN TRADE IN IRON AND STEEL.

The foreign trade of the United Kingdom in iron and steel and products thereof has shown some interesting changes this year as compared with last year. The monthly statistics just issued permit a comparison between the first nine months of last year and the first nine months of this year.

The most sweeping changes have been that as regards imports there has been a large decrease in iron ore and pig iron, with a great increase in crude steel, while as to exports there has been a material decrease in iron and steel proper, with no change in exports of iron and steel manufactures. In the metals and ores thereof, including copper, lead, tin and zinc, there has been a material increase in tonnage, but a decrease in total value on account of the large decrease in unit value.

The feature of the foreign trade in iron and steel of the United Kingdom which first strikes the American observer is its magnitude as compared with the operations for the domestic market. While the United States is a 25,000,000 or 30,000,000-ton country, measured in terms of pig iron producing capacity, the United Kingdom is a 10,000,000-ton country. Comparing annual rates as disclosed by statistics thus far this year, the United Kingdom imports nine times as much iron ore as the United States and five times as much iron and steel, although the pig iron imports alone are less, while the United Kingdom exports 34 times as much pig iron as the United States, four times as much iron and steel, and 75 per cent more manufactures of iron and steel, such as machinery, hardware, etc. With an output of about 10,000,000 tons of pig iron a year, the United Kingdom has been exporting iron and steel this year at the rate of more than 4,000,000 tons a year, while with our much larger capacity we have been exporting at the rate of barely a million tons a year.

The imports of the United Kingdom make the following curious comparison between the first nine months of last year and the first nine months of this:

Imports, United Kingdom, Gross Tons.

	1907.	1908.
Iron ore	5,967,809	4,428,896
Pig iron	71,924	45,196
Crude steel	220,491	384,944
All iron and steel	663,781	808,637

The designation above of "all iron and steel" does not include iron ore, but includes pig iron, crude steel, puddled bars, old material, castings, forgings, rolled products, nails, bolts, etc. The decrease in ore and pig iron imports, accompanied by the increase in crude steel and other iron and steel, illustrates the facility with which the movement changes according to commercial exigencies. The British trade at large does not consider it an unmixed evil when imports of partly finished material increase, at the expense of domestic production, if there is reason to believe that the manufacturing consumers of such partly finished material are benefited through lower costs.

British exports of iron and steel, including scrap, pig iron, rolled products, wire products, pipes and fittings, bedsteads, castings and forgings, have undergone a decline this year of 23 per cent in point of tonnage, but of only 21 per cent in point of value. The realized values declined, but the tonnage of the cheaper materials decreased more than the tonnage of the higher priced materials. The single items amounting to 100,000 tons or over are shown in the table below, together with the total tonnage of all these products, for the first nine months of last year and the first nine months of this year.

Exports, United Kingdom Gross Tons.

	1907.	1908.
Pig iron	1,553,909	995,830
Wrought iron bars	122,669	67,687
Rails	320,845	328,201
Galvanized sheets	364,342	282,287
Tin plates	299,892	298,828
Steel bars	178,533	125,449
Plates	234,910	165,921
All iron and steel	4,135,960	3,204,366

Thus there was a drop of more than one-third in pig iron, of almost one-half in wrought iron bars and of nearly one-third in plates, while tin plates practically held their own and rails made a slight gain. It was the Argentine business, increasing from 48,210 tons to 64,775 tons, which made this possible, as rail exports to most other countries showed material decreases.

With such a large decrease in exports of iron and steel proper, it is important to note that the exports of manufactures of iron and steel remained stationary. In the following table, a resumé is presented of the value of iron and steel manufactures exported in the first nine months of last year and this year respectively; all machinery excepting electrical machinery, is divided into prime movers and otherwise:

Exports, United Kingdom, Pounds Sterling.

	1907.	1908.
Electrical machinery	£ 733,958	£ 984,333
Other machinery, prime movers	5,815,409	5,616,996
Other machinery, not prime movers	15,768,751	16,588,187
Ships and boats	8,229,390	8,274,358
All other	8,422,921	7,482,525
Totals	£38,970,429	£38,946,379

The items under "all other" include cutlery, hardware, implements and tools and cycles, motor cars and motor cycles. The exports of all these iron and steel manufactures have been substantially the same this year as last, running at the rate of about $253,000,000 a year. Our own exports of iron and steel manufactures, including agricultural machinery, according to the statistics of the first eight months of the year, have been running at the rate of about $143,000,000 a year.

THE MIXER AND THE OPEN-HEARTH PROCESS.

We commend to the careful consideration of steel works managers, engineers and metallurgists, the paper by Arthur E. Pratt, dealing with the future of the mixer in connection with the open-hearth process, and abstracted on page 681 of this issue. That the mixer has not been used to the extent which its possibilities warrant, is the opinion of the author. So far, it has been used merely as a storage for liquid metal, while it is capable of use for removing some of the impurities which are later removed in the open-hearth process, and with greater economy than is possible in the latter.

Reasoning along these lines, the author proceeds to develop a new process of steel making, or rather a specialization of the open-hearth process, which shall utilize to the utmost the latent possibilities of the mixer. In this process, the endothermic and the exothermic reactions in the making of steel are to be performed in separate furnaces, with a great gain in efficiency and output. The author sums up the advantages of his proposed process, as follows: Continuity of output; increased yield; rapid work; low labor costs; ability to make high grade steel from low grade metal; smaller furnaces, cranes and ladles; a constant stock of molten scrap always available; and constant temperature conditions in the furnaces.

The reasoning of the paper seems to be sound, and if the practice works out in accordance with the theory, a long step in advance will have been marked in the open-hearth steel industry. While the process appears to be only in the theoretical stage as yet, it nevertheless deserves careful consideration.

The Merchants' Association of San Francisco is carrying on an agitation to obtain concessions from the railroads for the benefit of that city. The association announces that during the last 12 months structural steel and ornamental iron works in the city have been equipped with modern machinery, so that they can now compete with eastern manufacturers, provided a differential is allowed for the higher rate of wage and for the shorter hours enforced in San Francisco. This strikes us as a remarkable proposition. San Francisco is notoriously the worst union-ridden city in the country, and is now paying the penalty of its submission to union demands. The idea that the railroads should grant special concessions on account of the higher wages and shorter hours prevailing in the city is simply putting a premium on unreasonable demands by labor unions, and we do not believe that either the railroads or the interstate or state railroad commissions will be inclined to adopt this new policy.

The new technical high school of Cleveland, certainly one of the finest institutions of its kind in the country, was opened a few days ago. It is an interesting and significant fact that the decrease in the attendance of other high schools in the city amounted to only 47, though the new school has enrolled more than 800. This is clearly an indication that many of the young people who are enrolled in the technical school would not have attended any high school, had the new institution not been opened. The attendance of students at engineering colleges of the country is uniformly large this year. This is surprising at first thought, as a period of depression is generally considered unfavorable for college attendance, but the fact seems to be that many pupils who would naturally go to work after finishing their high school courses have been unable to obtain employment and have decided to go to college.

The sad news of the death of Bennet H. Brough, coming so unexpectedly after the recent meeting at Middlesbrough, is a great shock to his friends in many lands. For 15 years, Mr. Brough had been secretary of the great institute, whose progress during that period had been steady. Although he was an author himself, he will perhaps be best remembered for his success in getting others to write papers for the institute meetings. His energy was untiring and his courtesy unfailing. He died in the prime of life, aged only 48 years, when there was every expectation that he would be spared for many years of usefulness. He came with members of the institute when they made their two well remembered visits to the United States, and it was the pleasure of many men in the iron trade in this country to make his acquaintance.

In view of the numerous requests which come to us for the location of articles which have appeared in the current volume of THE IRON TRADE REVIEW, and which cannot be readily located by subscribers on account of the regular index not being issued until the volume is completed, we have arranged to print each week an index of the principal articles in the preceding week's issue. This index will be found on the advertising page facing the inside back cover, and will be printed such size that it can be cut out and pasted on a 3 x 5-inch index card, which can then be filed for reference until the regular index of each volume is issued.

NO CONDITIONAL ORDERS.

Editor of the IRON TRADE REVIEW:

In your issue of Oct. 8, I find an article from your correspondent at this place under date of Oct. 5, in which he quotes me as saying: "The hesitation caused by the political campaign is being met with the offer to all customers to cancel orders if the election in November does not result as expected by the buyer of iron."

I have made no such statement, and this company has persistently refused to sell iron coupled with any such condition.

J. C. MABEN, President.

Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., Oct. 16, 1908.

Election Invalidated.—At the annual meeting of the Lake Superior Corporation Oct. 7 a subsequent recount of the ballots cast for the election of four new directors, George W. Young, Thomas Gibson, Richard L. Austin and Solomon E. Kaufman, showed that but 194,176 shares were represented at the meeting and there was, therefore, no quorum. The ballot was suspended and the meeting adjourned sine die.

HANDSOME GIFT

To Ohio Mechanics' Institute of Cincinnati—Plans for Enlargement.

The Ohio Mechanics' Institute of Cincinnati has been the recipient of the magnificent sum of $500,000 through the munificence of Mrs. Thomas J. Emery, widow of the late real estate magnate, whose death occurred about two years ago in Egypt. This gift will enable the Mechanics' Institute to provide practical and technical education for its pupils on a scale which realizes the ambitions of its superintendent and board of directors. The school has long suffered for more commodious quarters and the gift of Mrs. Emery was presented for the purpose of erecting a suitable building for the school. Some time ago, the institute acquired property at the corner of Canal and Walnut, and it is proposed to erect upon this site a building 180 x 230 feet. The central idea of instruction to students will be in the iron and steel working department and the machine tool men of Cincinnati are much interested and gratified that this feature of the institution can now be provided. Prof. J. L. Shearer, president of the faculty, has labored long and earnestly to secure funds for the development and enlargement of the institution. The money now donated is to be used entirely for the erection of the building. The plans contemplate a five-story structure and basement, the basement being on the street level, which in reality makes a six-story building. One wing of the building is 230 x 45 feet. The basement floor will contain the power plant, which will also be used as a demonstrating proposition for the students, and the rest of the floor will be the blacksmithing department, with ample space for lectures. The second floor will be the machine shop. The third floor will be devoted to electrical and sheet metal work; the fourth, to carpentry, cabinet and pattern making. The fifth floor will be used in part for a drafting room; and the top floor will contain the foundry department, which is patterned after the Armour Institute, and some eastern institutions of similar character.

It is estimated that the new building will furnish ample accommodations for from 4,000 to 5,000 students in all branches, including the night course. The students are mainly young men and women who are seeking instruction to fit themselves for positions in the various industries in that city and the night courses are largely patronized by young men working as apprentices at trades during the day. In the iron and steel, machinery and electrical departments it is expected to provide instruction for from 2,000 to 2,500 students. This facility will enable the institute to attract students from other places, whereas in the past the facilities have been hardly adequate for local attendants. The object of the institution is to furnish instruction which will give to the pupils sufficient education to occupy good positions in the shops and factories, but does not attempt to give the higher technical educational advantages of a university.

With the Ohio Mechanics' Institute developed to the high plane of usefulness now practically assured and with the Cincinnati University co-operative technical course, Cincinnati will possess educational advantages for all classes of industry in the metal working lines of superior and diversified character.

The institute is one of Cincinnati's oldest institutions and was founded more than 80 years ago. The plans for the new building also include an auditorium to be placed at the disposal of worthy musical organizations for rehearsal purposes and for entertainments. The plans are not yet complete as to detail. The directors of the institute are: President, Walter Laidlaw, Laidlaw-Dunn-Gordon Co.; vice president, Perrin G. March, Cincinnati Shaper Co.; treasurer, Harvey E. Hannaford, Samuel Hannaford & Sons, architects; secretary, Harry T. Atkins, Atkins & Pearce Mfg. Co.; Fred A. Geier, Cincinnati Milling Machine Co.; William Lodge, Lodge & Shipley Machine Tool Co.; James C. Hobart, Triumph Electric Co.; John M. Hubbell; Dr. John C. Kunz, physician; M. B. Farrin, M. B. Farrin Lumber Co.; R. K. LeBlond, LeBlond Machine Tool Co.; O. W. Bennett, law counsel.

Large Coal Contract.—The Pittsburg-Buffalo Co., Pittsburg, has closed a contract with M. A. Hanna & Co., Cleveland, by which the latter company will take the entire output for a period of five years, of the former's Rachel, Agnes and Blanche mines. The coal is to be shipped to lower lake ports and thence to the head of the lakes for consumption. It is understood that 3,000,000 tons yearly is involved in the contract. The rumor that a large tonnage of coke was also included in the transaction is officially denied.

COMPANIES AMALGAMATE.

Canada Iron Corporation Is Formed with T. J. Drummond as President.

Toronto, Canada, Oct. 17.—The Canada Iron Corporation has been organized by the amalgamation of the Canada Iron & Foundry Co., the Canada Iron Furnace Co., John McDougall & Co., the Annapolis Iron Co., and the Londonderry Iron Co., which control charcoal blast furnaces, foundries and mines in the eastern provinces. The corporation is capitalized at $5,000,000 common and $3,000,000 preferred stock and there are $2,500,000 6 per cent first mortgage bonds. The directors are T. J. Drummond, president; G. E. Drummond, Edgar McDougall, C. C. Chipman, A. Cockshrett and George Gudwell.

The Northern Navigation Co. has let a contract to the Collingwood Ship Building Co. for the construction of a steel passenger steamer to cost $60,000, 135 feet long with 25 feet beam. She will have triple expansion engines, twin screws and a speed of 16 miles an hour and is to be ready for service by May 15, next, on the route from Collingwood to Midland, Penetang and Parry Sound.

The Dominion Iron & Steel Co., Sydney, N. S., is getting into better financial shape. It has just redeemed $250,000 of its 6 per cent second mortgage bonds. The full issue of these bonds was $2,500,000, the outstanding amount having now been reduced to $1,500,000. They are retired by means of a sinking fund of 10 per cent or $250,000 a year, this charge being one of the heaviest which the company has had to carry. Percy McNaughton, sales agent of the company, left this week for Mexico on a business trip.

Change of Name.—By recent vote of the members of the Foundry Supply Association it was agreed by a large majority to change the name of this organization to the Foundry & Manufacturers' Supply Association, the sole object of this move being to increase the interest in the annual meetings, by permitting any machine tool or other article to be exhibited in connection with foundry supplies. This action has not been prompted by a desire to hold an independent exhibit apart from the American Foundrymen's Association, but, on the contrary, to affiliate with the other foundry organizations as heretofore, and, if possible, to make the meeting more interesting by enlarging the scope as well as the membership.

AMERICAN SHIP BUILDING CO.'S REPORT.

Net earnings of the American Ship Building Co. dropped $593,000 in the fiscal year ended June 30, as compared with those of the preceding year, but were still sufficient to leave a balance equivalent to 10.16 per cent on the common stock after the payment of 7 per cent on the preferred. Charges for depreciation, maintenance and rebuilding of docks during the last year, however, were about $312,000 less than in the preceding year.

Income Accounts Compared.

Following is the company's income account for the year ended June 30, in comparison with that of the preceding year:

	1908.	1907.
Net earnings	$1,713,908	$2,307,779
Depreciation and m'tnce	387,961	497,168
Rebuilding docks	.....	204,166
Maintenance reserve	.....	.....
Balance for stock	$1,325,947	$1,606,445
Preferred dividend	553,000	553,000
Balance for common	$ 772,947	$1,053,445
Common dividend	456,000	456,000
Surplus for year	$ 316,947	$ 597,445
Previous surplus	5,695,610	5,098,165
Total surplus	$6,012,557	$5,695,610

The balance sheet shows a total of nearly $6,200,000 of quick assets, against $1,673,000 of accounts and bills payable.

At the annual meeting of the stockholders in Jersey City, W. C. Carpenter was elected a director in place of F. W. Hart. The other directors were re-elected. In his report to the stockholders, James C. Wallace, president of the company, said:

"The company built and completed 23 vessels during the fiscal year and now has under contract four vessels. Owing to the general depression in business all over the country, which has been felt very keenly in all branches of the iron and steel industry, and especially so in the lake carrying trade, which depends largely upon the movement of coal and ore for its business, the outlook is not at all bright for any great amount of bulk freight vessel construction this year. The passenger business all over the lakes has been very good and there is some talk of new construction in this direction."

THE CRANE-BEST CO. ORGANIZED.

The Crane-Best Co., Chicago, has entered into a partnership arrangement with the Best Mfg. Co. of Pittsburg, and the business of the heretofore competing companies will be carried on in the future under the name of the Crane-Best Co. This association is one similar to those in which the Crane Co. is established in various other cities and the new organization will be the Pittsburg representative of the Crane Co., handling the same products which have been common to both companies previously. A new plant site has been purchased consisting of 60 acres on the Allegheny river at the lower end of Oakmont Borough, and about nine miles from Pittsburg. A large building will be erected and the plant of the Best Mfg. Co. moved into it.

MEETING OF IRON AND STEEL ELECTRICAL ENGINEERS.

The Association of Iron and Steel Electrical Engineers inaugurated its second year with three days of valuable discussion and plant inspection at Chicago, Oct. 14, 15 and 16. The meetings were held in the rooms of the Western Society of Engineers. The following officers were elected for the ensuing year: President, J. C. Reed, electrical engineer, Pennsylvania Steel Co.; first vice president, G. M. Sturgess, electrical superintendent Lackawanna Steel Co.; second vice president, S. R. Palmer, electrical superintendent Jones & Laughlin Steel Co.; treasurer, E. W. Yearsley, electrical engineer, Midvale Steel Co.; secretary, G. H. Winslow, electrical engineer National Tube Co., Pittsburg.

A number of papers were presented and plants visited and in conformity with the specific purpose of the society, all were discussed with complete frankness, both from the standpoint of the mill and the manufacturer, with the result that the manufacturer gained valuable information concerning the performance of electrical mill machinery under different conditions, and the engineers became more familiar with the manufacturer's methods, projects and viewpoint. The program included the following features:

"Electro-Magnets for Scrap-Breaking," Geo. W. Richardson.
"Lifting Magnets," C. Pirtle, Electric Controller & Mfg. Co.
"Electric Motor Drives," E. W. Yearsley.
"Increases in Production by Machinery on Motor Driven Line Shafts" (brief note), G. H. Winslow.
"Mill Type Motors and Controllers," Mr. Knight and Mr. Whiting, General Electric Co.
"Low Pressure Steam Turbines and Centrifugal Compressors," C. J. Callan and Thos. Raddin, General Electric Co.
Automobile trip to Western Electric Co.'s works at Hawthorne—Low Pressure Steam Turbines, Henry H. Wait.
Return to Chicago for luncheon as guests of Western Electric Co.
Low Pressure Turbines, Edwin Yawger, Westinghouse Machine Co.
Power Transformer and A. C. Motors, W. A. Gayman, Wagner Electric Co.
General Talk on Electric Apparatus, Westinghouse Electric & Mfg. Co.
A. C. & D. C. Motors, Gano S. Dunn, Crocker-Wheeler Co.
Dinner, as guests of Crocker-Wheeler Co.
"Gas Engines and Turbo-Generators," E. T. Adams, Allis-Chalmers Co.
Leave for Indiana Steel Co., Gary, Ind., as guests of Allis-Chalmers Co.

The Association of Iron and Steel Electrical Engineers is intended to provide for the electrical engineer most closely in touch with the electrical department of that iron or steel plant with which he is connected a means of intimate intercourse with the general experience in all of the iron and steel plants and with the manufacturers of the machinery which he is using. It is hoped that the opportunity thus presented will attract a membership that will be representative of all the important mills of the country and therefore representative of the general practice in the electrical side of iron and steel manufacture.

RECENT CUSTOMS DECISIONS.

The board of general appraisers has decided as follows:

Double-barreled breech-loading shot guns are dutiable at $6 each and 35 per cent. Extra detachable locks accompanying the same are dutiable at 50 per cent.

Nickel alloy in sheets, 6 feet long, 8 inches wide and 0.064 of an inch thick is dutiable at 6 cents per pound under paragraph 185.

Bronze wire rods composed of an alloy of copper and phosphor tin, copper representing 94 per cent of composition and used for making wire, is free of duty as "composition of metal of which copper is component material in chief value, not specially provided for." The assessment was made at 2½ cents per pound on entries of Driner-Harris Wire Co., Newark, N. J.

Protests of Hermann Boker & Co., were sustained to the extent that "sheet steel in strip" are not dutiable at 45 per cent but at 47 cents per pound or less as "steel in forms and shapes, not specially provided for." Where the merchandise was in short lengths, the assessment was affirmed and only in the instances of the steel in coils about 150 feet long were the assessments reversed.

the main plant.

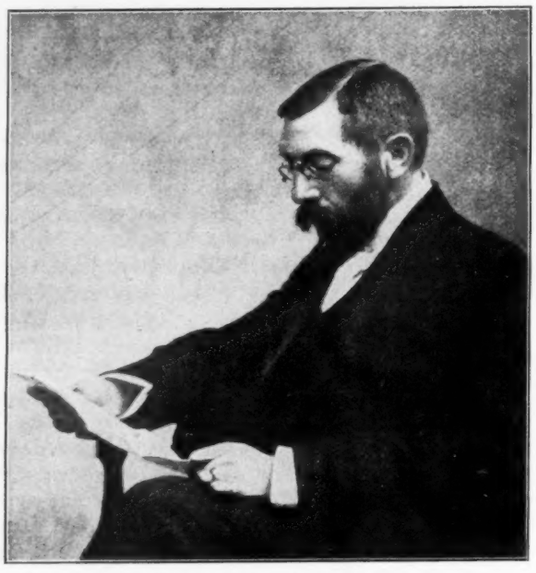
The report that the Page Woven Wire Fence Co., Monessen, Pa., had begun the construction of additional open-hearth furnaces at its plant, is officially denied. The company completed a new 50-ton furnace sometime ago and this has been in operation since July.

The fireproofing department of the Youngstown Iron & Steel Roofing Co., Youngstown, O., was damaged to the extent of about $75,000, Oct. 17. This department is separate.

DEATH OF BENNETT H. BROUGH.

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Oct. 7.

A sad sequel to the meeting of the Iron and Steel Institute at Middlesbrough, England, occurred in the death of Bennett H. Brough, who for 20 years had been secretary. Mr. Brough had taken his usual predominating share in the organization of the conference and the arrangements which he had helped the president and council to make resulted in one of the most interesting conferences the institute has held. Always a busy man, Mr. Brough had excelled himself on this occasion in organizing visits to works and other subsidiary functions, besides carrying out with his usual efficiency the business arrangements for the conference.



BENNETT H. BROUGH.

During the sittings of the conference Mr. Brough was very much in evidence and in the evening he traveled some distance out to stay with the president, Sir Hugh Bell, at Rounton Grange. He was present at Wednesday's meeting, but on Thursday morning of the conference Sir Hugh Bell had to announce that Mr. Brough could not attend, having become indisposed. Sir Hugh regretfully added that he feared that he himself was partly responsible for this breakdown, because the institute, on his initiative, had attempted an unusually large program of works visits and entertainments. He hoped the indisposition would prove to be temporary. On Thursday evening, though Mr. Brough was in much pain, no special alarm was felt, but on Friday the illness proved more serious, and the patient was taken to a private hospital at Newcastle-on-Tyne for special treatment. Here he died on Saturday night, Oct. 3.

The loss to the iron and steel trade of Great Britain, and indeed of the world, is a great one. Mr. Brough on account of the visits abroad of the institute, was well known to the ironmasters and the public of many nations, and his visits with the institute to America in 1890 and 1904 are well remembered. During his secretaryship he organized with extraordinary success a series of conferences, not only in the United Kingdom, but in France, America, Belgium, Spain, Sweden, Austria and Germany. The foreign visits of the institute, in fact, were a distinguishing feature of his secretaryship. He was a clever linguist and rendered great service on many occasions by interpreting the speeches of foreign visitors. He contributed papers of great value to the proceedings both of the institute and of its branches, and in the program of several of them for the coming winter, including that of the South Staffordshire institute, his name appears. On the occasion of the institute's visit to Stockholm in 1898, Mr. Brough was made by the king of Sweden a knight of the Swedish Order of Wasa. Mr. Brough, who lived at Fairholm, Surbiton Hill, Surrey, was also an associate of the Royal School of Mines, a fellow of the Geological Society, a fellow of the Institute of Mining Engineers, a fellow of the Chemical Society, and a fellow of the Institute of Chemists. Of all these societies, he was or had been a member of the council. He was formerly an instructor in mines, surveying at the Royal School of Mines. His publications include a treatise on mining surveying, 1888 (12th edition 1906), and a large number of papers on mining and metallurgy.

Joseph Painter, Sr., head of the firm of Joseph Painter & Sons, iron founders, Myertown, Pa., died Oct. 9, aged 86.

PERSONALS.

James R. Thompson, who has been manager of the Schlesinger mines on the Gogebic range near Ironwood, Mich., has resigned, and Luther C. Brewer has been appointed manager.

John A. Topping, chairman of the Republic Iron & Steel Co., has returned from his vacation spent in Canada.

Charles F. Hilker, president of the Hamilton Foundry Co., Hamilton, O., was seriously injured in a runaway accident last week at his home. His wife, who accompanied him, sustained serious internal injuries also.

B. F. Bourne, of the Bourne-Fuller Co., Cleveland, has returned from a trip to Europe.

Will Build Ovens.—The Mt. Hope Co., Uniontown, Pa., has been organized to develop a tract of coal coking land near Linn, Pa., on the Redstone branch of the Pennsylvania railroad. Preparations have been made for the immediate commencement of operations and it is proposed to erect a plant of 150 new type coke ovens with an output of 12,500 tons per month. The company is capitalized at $400,000 and the officers are F. N. Armour, Pittsburg, president; John M. Taylor, Uniontown, vice president; Isaac Taylor, Uniontown, treasurer; E. E. Strickler, Uniontown, secretary.

Large Brick Contract.—The Harbison-Walker Refractories Co., Pittsburg, has taken the contract for furnishing the fire and silica brick to be used in the construction of a 50-oven by-product coke plant which will be erected by a gas company at Indianapolis. About 1,000,000 brick will be required.

The first shipment of steel billets from an Indiana port was sent out Oct. 7 from Indiana Harbor, the steamship Niagara clearing with 3,000 tons from the Inland Steel Co. to a purchaser in Detroit.

AMONG MACHINERY MAKERS.

CHICAGO.

Moderate Amount of Buying—Some New Enterprises.

Office of THE IRON TRADE REVIEW, 1328 Monadnock Block, Oct. 19.

Manufacturing concerns in this territory report that they are now buying more or less machinery continually, one or two tools at a time, and it is very plain that with the increased volume of business that has actually arrived through slow stages this must be done and repairing equipment long since fit only for the scrap heap is no longer adequate.

The Link Belt Mfg. Co. has just received a King vertical boring machine from the King Machine Tool Co. and has another ordered.

Pawling & Harnischfeger, Milwaukee, received from the Bethlehem Steel Co. last week an order for five 10-ton cranes for the Saucon plant of that company. These are similar to the order of 10 previously furnished by Pawling & Harnischfeger. Four of the cranes just ordered are to have a span of 84 feet and one of 110 feet. Some of the features embodied in the design of these cranes include riveted box sections, with extra wide wheel base platforms extending the full length of the bridges, all steel gears and bridge truck wheels, bronze bushed cap bearings and high speeds. In addition to this order, Pawling & Harnischfeger will furnish two pillar cranes to the Chicago, Milwaukee & St. Paul railway of 10 and 20 tons capacity, one five-ton, 48-foot span crane to the Lynchburg (Va.) Foundry Co., a carrying system to the Tremont Lumber Co., involving over 13,000 feet of 15-inch I-beam runway, and four electric traveling hoists and equipment; electric traveling hoists to Williams & Wilson, Canada, and Pettibone-Mulliken & Co., Chicago.

Lemley & Schultz, formerly partners in the machinist business in Chicago, have dissolved partnership by mutual consent, Mr. Lemley's interest having been purchased by Mr. Schultz. The business will be continued as formerly.

The Hewitt Mfg. Co., Chicago, has purchased the business and stock of the Twentieth Century Brass Works and will erect at Houston, Tex., additional buildings and a brass foundry. This enterprise will be associated with the Chicago establishment. The incorporators in Texas are W. F. Short and John C. Harris, of Houston, and W. H. Croft, of Chicago.

The general contract for the new smelting and refining plant of the Great Western Smelting & Refining Co., Chicago, previously mentioned in THE IRON TRADE REVIEW, has been let to H. Eilenberg, 153 LaSalle street, Chicago. The construction will be of steel and concrete and the buildings will include a foundry, smelter, refining plant and one other building, all one story and 60 x 160, 50 x 400, 40 x 360 and 130 x 400 feet, respectively.

The Southern Machine Iron & Foundry Co. was incorporated at New Orleans, La., with a capital of $10,000 by John Buchmann, Albert Hubener, Wm. Robinson.

The Peerless Parting Co. was incorporated in Chicago last week by Willis Hutson, Richard H. Mather and Rex G. Hardy, to do a foundry and manufacturing business.

The Independent Die Co., St. Louis, Mo., will increase its facilities and build an addition to its plant, 50 x 110 feet.

The Rock Island Tool Co., Rock Island, Ill., has let the contract for a one-story foundry and machine shop, 80 x 160 feet, to H. W. Horst, of that place. E. C. Battendorf is secretary and manager of the company.

The Badger Malleable & Mfg. Co., South Milwaukee, Wis., is to erect a new machine shop and foundry. The machine shop will be 60 x 200 feet, and the foundry 60 x 440 feet.

New electric power plants are to be erected at Garden City, Kas., by the Kansas-Colorado Electrical Transmission Co., and at Danville, Ind., by the Danville Light & Power Co.

The American Tube Co., Chicago, Francis W. Adams, president, is about to erect a two-story addition, 36 x 146, to its plant on South Rockwell street. The permit has just been issued and the contract has not yet been let.

BUFFALO.

General Improvement Reported—One Large Transaction.

Office of THE IRON TRADE REVIEW, 932 Ellicott Square, Oct. 19.

A general betterment is reported in the local machinery market, based on the number of inquiries received. Selling is fair, the transactions being small but numerous. Most of the selling the past week has been to concerns through New York and probably the largest actual transaction during the period named was the sale of two 12,500-horsepower generators to the Ontario Power Co., which will be installed in the company's addition to its power plant at Niagara Falls, Ont. This contract also included the switch apparatus, and was awarded to the Westinghouse Electric & Mfg. Co.

The coming election appears to be exerting an influence over machinery trade conditions, although not affecting the inquiries in this territory, but substantial business, which has been pending for some weeks, has suffered a delay from this cause. The most important figuring is being done with manufacturers reported to have located along the Niagara frontier. Quite a number of transactions of this character are under way now, and, should they be closed, the machinery market will become more active than usual.

NEW YORK.

Little Buying by Lists and Not Much of Any Kind.

Office of THE IRON TRADE REVIEW, Room 1005, No. 90 West St., Oct. 19.

The machine tool and equipment trade is suffering considerably from the spirit of hesitancy incident to the election, and there is every prospect that October sales will fall short of those of September, which, however, were generally the best of the year. There is still an almost complete absence of buying by lists, sales being confined to scattered tools. The eastern trade is not benefiting to any great extent from the activity of the automobile industry, as the plants which are enlarging their facilities are chiefly in the west. One of the strongest lines at present is power plant work, both new installations and additions to existing plants, and some attractive orders are being booked. Interest in the machinery trade has been centered in the fall meeting of the National Machine Tool Builders, an account of which appears in another part of this issue.

The state department of public works has awarded to Arthur McMullen & Co., contractors at 13 Park Row, New York City, barge canal contract No. 55, at a bid of $905,347, over $100,000 less than the state engineer's estimate. The contract covers the construction of a dam and its appurtenances near Delta, at the head waters of the Mohawk river.

Johnson & Johnson, New Brunswick, N. J., have just completed the installation of a new power plant of between 3,000 and 4,000 horsepower capacity. Babcock & Wilcox boilers are employed, Watts Campbell engines and Crocker-Wheeler A. C. generators and motors. In addition, the power plant has been equipped by the Vandyck-Churchill Co., New York City, with a complete system of lubrication, for handling both cylinder engine oil and machine oil used throughout the works. The system is automatically operated by compressed air, the installation being thoroughly unique.

The Clark Thread Co., Clark avenue, Newark, N. J., is preparing to install a steam turbine central power station of sufficient capacity to accommodate its two adjacent plants, and is understood to be making other important improvements at its works.

The Davis-Bournonville Co., manufacturer of oxy-acetylene welding and cutting apparatus, with offices at 90 West street, New York City, is preparing to erect a new plant near the Marion station of the Pennsylvania railroad in Jersey City. This will be of concrete construction, 50 x 100 feet, the ground floor for manufacturing and demonstration purposes and the second floor for offices. The company has found the demand for its oxy-acetylene apparatus so heavy that its present facilities, near the site of the new plant, are inadequate. Augustine Davis is president of the company, Eugene Bournonville, vice president, and C. B. Wortham, secretary and treasurer.

The Standard Oil Co., 26 Broadway, New York City, has specifications out for the erection of a candle house at its Pratt works in Long Island City. It is understood that other improvements are being made at this plant.

Announcement is made that the Manville Bros. Co., 27-33 Benedict street, Waterbury, Conn., has purchased from Frederick E. Cross, of the Cross & Spiers Machine Co., Waterbury, all the drawings, patterns, etc., of the different lines of machinery manufactured by the latter company. In the future these lines will be made by the Manville Bros. Co., with which Mr. Cross will be connected as a special representative. Officers of the company are: Robert C. Manville, president; William W. Manville, treasurer; and Tracey F. Manville, secretary.

An important change in the organization of the American Locomotive Co. is announced. James McNaughton, manager of the Schenectady works, has been elected vice president in charge of sales, to fill the vacancy caused by the resignation of R. J. Gross. W. L. Reid, superintendent of the Schenectady works, has been appointed manager of that plant to succeed Mr. McNaughton.

The Emerson Steam Pump Co., Alexandria, Va., has acquired a site of about three acres in that city and, it is reported, will erect several buildings for manufacturing purposes. W. R. Emerson is vice president of the company.

Under the title of Neal Farnham, Inc., 1 Madison avenue, New York City, the business heretofore conducted by the National Waterproofing & Cleaning Co. has been taken over. The new company, which has been incorporated with a nominal capitalization, will also handle contract work for the Farnham Sand Blast Co., offices of which are the same address.

INDIANAPOLIS.

Election Activity Having a Retarding Effect on Business.

Indianapolis, Ind., Oct. 19.—There is more activity than usual in local iron working and machinery plants. Some of the plants are increasing their forces, but whether or not this is temporary cannot be determined. There is no doubt, however, that the coming election is having some effect on local manufacturing conditions. A greater effort than ever is being made this year to organize factory employes for the two political parties.

After considerable negotiating, the Rahn-Carpenter Co., of Cincinnati, has finally signed a contract to move its plant from that city to Anderson, the removal to be made within three months. It is one of the provisions of the contract that the company shall employ 700 people.

The Byram Foundry Co., one of the oldest concerns of its kind in the city, has just decided to issue $40,000 worth of preferred stock. It is to be issued in shares of a par value of $100 each.

Irving A. Sibley has brought suit for a receiver for the Malleable Steel Range Co. of South Bend, not because the company is involved financially but because he believes there is a combination of stockholders against him. He charges, among other things, that the profits, which are large, are in danger of being wasted by the officers.

E. C. Atkins & Co. are completing a large factory at Hamilton, Ont., which will be ready for operation in about 30 days. It has been built at a cost of $250,000 and H. P. Hubbard, formerly superintendent of the local plant, will have charge of the new factory. The company has had a Canadian branch house for some years, but found that if the goods were manufactured on Canadian soil, they could be shipped free of charge to British possessions.

A meeting will be held some time this week to take steps for the organization of a traffic club which will include shippers and railroad men in its membership.

CINCINNATI

Machine Tool Makers Are Patiently Awaiting Return of Prosperity.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg., Oct. 19.

Orders for machine tools during the first half of October have been spasmodic and scattering, some shops reporting the September record maintained or exceeded, while some report a falling off—and hesitation attributed to an inclination on the part of buyers to wait until after the election. On the whole, the business remains quiet, with the manufacturers hopeful and waiting developments complacently and patiently. This industry has experienced depressions in the past and has learned the lesson of waiting for a return to prosperity. The shops appear to be sufficiently strong financially to continue operations on a moderate scale and accumulate stock conservatively. While such a situation is not satisfactory, it is fortunate that the concerns possess sufficient resources to stand the strain of a long depression. It was one year ago this month that the panic began in earnest and we do not recall a receivership of a single machine tool industry in this city, although there are about 75 shops, large and small, located here.

The administrative council meeting of the National Metal Trades Association, which was to have been held at the Sinton hotel on Oct. 26 and 27, has been postponed, and will be held Oct. 29 and 30 at the same place.

The W. T. Johnson Co., dealer in machinery and supplies, which has been located at 523 Main street for the past 10 years, has executed a 10-year lease for the six-story stone front building at the northeast corner of Third and Vine streets. President W. T. Johnson said that the

Diamond Machinery Co., which is associated with this concern, will also make the same move. The dimensions of the building to be occupied are 70 x 100 feet.

The Cincinnati Pulley Machinery Co. has been fortunate in receiving a nice line of orders, particularly for its sensitive drills, and is running full time and full force. The company is shipping this week on one order a lot of 50 single spindles and has received during the week some satisfactory new orders, one of which is from England.

The Cincinnati machine tool builders are much interested in the annual convention of the National Machine Tool Builders' Association and a party has been made up which left on Sunday night, Oct. 18, consisting of Wm. Lodge and Murray Shipley, of the Lodge & Shipley Machine Tool Co.; C. Wood Walter and F. A. Geier, of the Cincinnati Milling Machine Co.; R. K. LeBlond, of the R. K. LeBlond Machine Tool Co.; A. M. Watcher, of the Queen City Shaper Co.; Rufus King, of the King Machine Tool Co.; A. B Doan, of the American Tool Works Co.; Clifford Kern, of the Kern Machine Tool Co.; Wm. Boye, of Schumacher & Boye; Mr. Kruseberg, of the Champion Tool Works; W. T. S. Johnson, of the Bradford Machine Tool Co.; Mr. Radcliff, of the E. A. Kinsey Machinery Co.; P. G. March, of the Cincinnati Shaper Co.; Wm. E. Gang, of the W. E. Gang Co.; George Gradolf, of the Bickford Drill & Tool Co.; and B. B. Quillan, of the Cincinnati Planer Co.

The Rahn-Carpenter Co., of Cincinnati, is negotiating with the Citizens' factory committee of Anderson, Ind., for a site and bonus, with a view to locating an addition to its present factory at Anderson, Ind. It is understood that the Cincinnati plant will remain here, that the negotiations contemplate an important increase in the company's operations and that both plants will be operated.

PITTSBURG.

Some Increase in Inquiries, but Election Causes Postponement.

Office of THE IRON TRADE REVIEW,
510 Park Bldg., Oct. 19.

The machinery situation continues "spotty," with the aggregate of orders being placed showing little change. The outlook for the future appears better, but just at this moment the approaching election is overshadowing all other influences in the market, and is holding, temporarily, many projects in abeyance. A better inquiry from scattering sources, other than the railroads, represents machine tool conditions. There is a little more business in lathes and boring mills coming out. Makers of steel works and rolling mill equipment report improvement in business booked, September having brought in a larger number of orders. The United States Steel Corporation has been placing contracts for the improvements to the Ensley, Ala., plant of the Tennessee Coal, Iron & Railroad Co., and a number of these have come to manufacturers in this district.

Small engines are in fair demand and pumps are moving steadily in a limited way. Mine companies are showing activity in installing water purification systems in their power plants. The general mercantile trade is furnishing a number of contracts for refrigerating machinery. Manufacturers of ice-making machinery held a meeting the past week in this city, but made no announcements of interest to the trade at large. Some large contracts for emery wheels are being placed and this is regarded as encouraging as an indication of better industrial activity. Track tool makers are quite busy and an increase in the bookings of brake shoe manufacturers is reported.

The Mesta Machine Co. has recently been a buyer of some equipment for its new foundry which is rapidly nearing completion. The new building is 300 feet in length and will be very modernly arranged and equipped. The Mesta Machine Co. has just closed for two 84 and 84 x 60 vertical long crosshead blowing engines for the Tennessee Coal, Iron & Railroad Co. at Ensley, Ala. With the two additional engines, the Mesta company will have installed 26 engines of this type in this steel works. The Mesta company will also furnish the tilting mechanism for a 600-ton metal mixer for the Ensley plant, which will be one of the largest, if not the largest, mixer of its kind in the United States.

The Universal Rolling Mill Co., which is erecting a merchant mill at Bridgeville, Pa., has closed for mill shears and other equipment for its works. Walter Baker, Washington, Pa., is one of the parties interested.

The Philadelphia Traction Co. has placed an order with the N. C. Davidson Co., Pittsburg, for a 750-horsepower Riverside engine which will be used for electric plant purposes. The H. K. Porter Locomotive Works has also taken a 250-horsepower direct connected Riverside engine for its works in this city. The N. C. Davidson Co. has sold a 100-horsepower Riverside engine and dynamo to the city of Phillippi, W. Va., for a public electric light plant, and a pump plant of the Aldrich triplex type of 200,000 gallons capacity, also a 50-horsepower gas engine drive to the Kittanning Brick & Fire Clay Co., Kittanning, Pa., as well as a number of deep well pumps to the East McKeesport Water Co., Wilmerding, Pa.

The Colonial Steel Co., which recently increased its capital stock from $1,250,000 to $2,000,000, does not contemplate any extensive mill additions at this time, and the increased capital will be devoted mainly to the greater financial requirements of an expanding trade. Eventually some improvements will likely be made to the company's plant at Colona, Pa.

Figures have been taken by the Carnegie Steel Co. on several large contracts for piping equipment for the new blast and open-hearth furnace improvements at the Ohio works, Youngstown, and the new open-hearth construction at the Duquesne plant.

The Pittsburg Plate Glass Co. has been taking bids upon the installation of a gas engine power plant for its works at Kokomo, Ind. A gas engine of 5,000-horsepower capacity will be required.

The Woolley Gas Power & Equipment Co., Pittsburg, has just installed a freight elevator operated by a 12-horsepower Callahan gas engine, for the Kane & Keyser Hardware Co., Belington, W. Va.

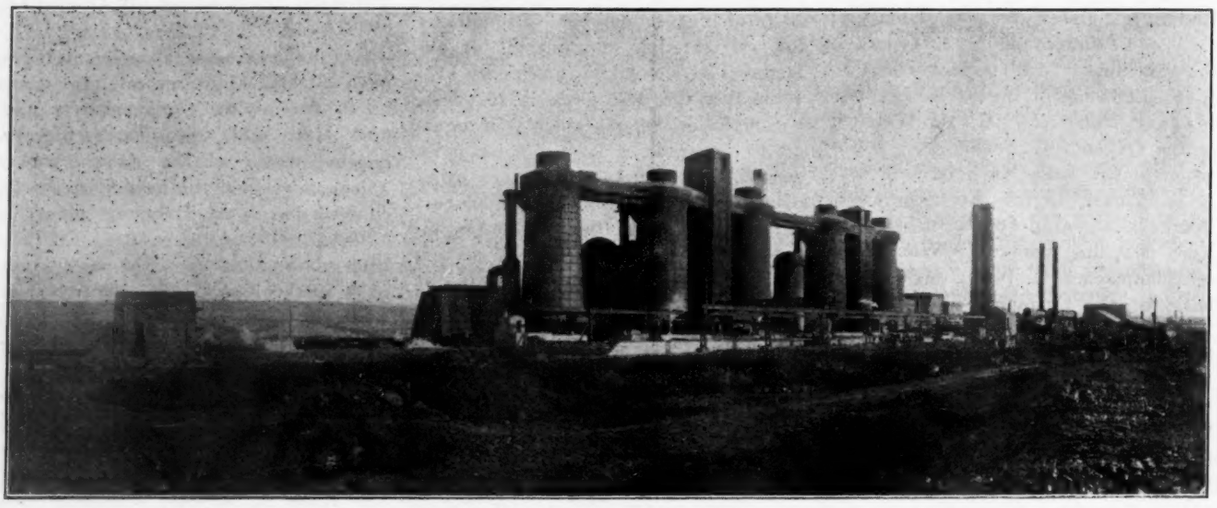
The Wm. B. Scaife & Sons Co., Pittsburg, has made contracts for its water softening and purifying systems with the following mining companies: United Coal Co., Pittsburg, 800 horsepower We-Fu-Go system for its Rich Hill mine at Meadowlands, Pa.; the Cymbria Coal Co., Philadelphia, 500 horsepower We-Fu-Go system for its mines at Barnesboro, Pa.; Pittsburg-Buffalo Co., Pittsburg, 1,000 horsepower We-Fu-Go system for its Frances mine at Burgettstown, Pa., and the Rochester & Pittsburg Coal & Iron Co., Punxsutawney, Pa., 750 horsepower We-Fu-Go system for its Adrian mines at De Lancey, Pa.

An extension to Nov. 16 has been granted the receivers of Milliken Bros., Inc., New York City. The promised reorganization plan was not ready for announcement Oct. 1, when the last extension expired.

THE BLAST FURNACE PLANT OF THE SKINNINGROVE IRON CO., Ltd., CARLIN HOW, YORKSHIRE[1]

There is much to interest the iron trade expert in the blast furnaces of the Skinningrove Iron Co., Ltd., from the standpoint of mechanical excellence and economical production generally. The works proved a center of attraction to a large number of institute visitors. The situation of the furnaces could not possibly be more advantageous. They are built on tidewater at the mouth of the tees, and having their own wharf for shipment they avoid dock dues and are able to send away the whole of their product by water. The Cleveland iron stone is close to the works and the only rail haulage necessary is for coal and limestone from Durham. The Cleveland ironstone and is content with six to seven pounds per square inch. There are in all seven blowing engines, of which the largest have blowing cylinders 100 inches diameter.

The general arrangements are roomy, especially in regard to the layout at the back of the furnaces. Each pair of furnaces has one hoist and five kilns. The ore is taken directly from the kilns into the charging barrow, which by means of a gradient runs to the hoist platform by its own weight. There is another fall of gradient from the level of discharge at the top of the hoist to the charging hoppers of the furnace. The limestone is calcined in the same kilns as the ore, the charging barrows being weighed automatically by Pooley machines.



SKINNINGROVE BLAST FURNACE PLANT.

There are 13 hot-blast Cowper stoves. A special feature of these is that the valve connecting with the hot blast main is 24 inches diameter, while the further valves between the main and the furnace are 30 inches diameter. To this peculiarity is attributed the fact that blast pressure at the tuyeres is practically identical with that indicated at the engine house. In other words, the adoption of large valves has got over the loss due to the throttling of the blast at the inlet or outlet valves. In the superintendent's office there is a recorder showing automatically the blast pressure and times of charging. This is the invention of T. C. Hutchinson, the managing director. Primarily, it consists of a clock which moves a cylinder on which record diagrams are made on paper from five pencils, of which four record the times of charges. This enables the manager to see at a glance if the charging has been regular during the night or day shift. The knocking off of a catch or the keeping open of a bell too long is recorded by a slight line. Each pencil is electrically operated from the charging bell of the furnace it represents by the simple means of a mercury cup which, when the lever comes down, makes a contact with it, completes an electric circuit, and operates a pencil. The fifth pencil connected with the mercury column gives the line showing the blast pressure. Power is furnished by 19 boilers of which six are single flue boilers, four of the Lancashire type and nine are Beeley three-tube boilers. In the various extensions of the plant, the concrete and cement employed in the foundations is made from slag cement.

Cleveland stone produces an exceptionally large quantity of slag and at some places is awkward to get rid of. It is tipped at the Skinningrove works by means of a locomotive and 12-ton ladles over a cliff into ravines a short distance from the works, spacious enough to take all the refuse for many decades to come.

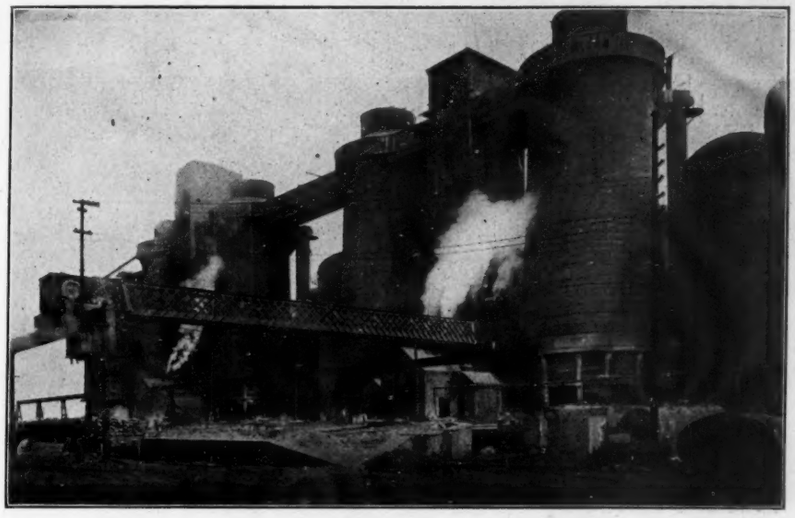
It has been found possible to clear the pig beds by means of a traveling crane, the pigs being first piled into slings weighing 2½ tons each. A couple of men are employed putting the pigs into piles, of which four are lifted by the crane and placed on a

land stone is about 9 feet thick, containing from 27 to 28 per cent of metallic iron with no sulphur. The iron ore is prepared for the kilns by means of a cleaning belt, which spreads out the stone exposing impurities and shale which are picked out by hand, thus reducing the proportion of slag.

The smelting plant consists of five furnaces of which four are usually in operation. One of the five which was added seven years ago is fitted with eight tuyeres, while the others have six. The output is about 3,000 tons a week, recent extensions in boilers and water softening plant having added from 200 to 400 tons per week. Fashions in regard to blowing pressure have changed of late years, some of the Cleveland furnaces blowing up 20 pounds per square inch. But the Skinningrove Co. believes in moderate pressure for Cleve-

[1]One of the works visited by the Iron and Steel Institute at its recent Middlesbrough meeting.

metal bogie. The crane system employs five men for the disposal of the iron after it has been cast and broken.



CASTING SIDE, SKINNINGROVE BLAST FURNACE PLANT.

Practically all the make is exported to Scotland or Germany. To facilitate loading, a substantial and extensive jetty was built of slag and slag cement. It is furnished with electric light and steam trains and loading commences with the rise of the tide, 570 tons being put on board one of the company's steamers in 3½ to 4 hours.

A most important development now in progress will bring the company into the field as a maker of finished steel. The principal object in this extension is the utilization of the initial heat in the pig iron which is now cooled down on the pig beds. The firm is putting down steel works which for the present will consist of one central tilting Talbot furnace of 250 tons capacity. A 40-ton electric crane will be used on the charging side, and a 75-ton electric crane on the casting side of the furnace. Auxiliary crabs of 20 tons capacity are fitted on to each crane, for the purpose of tilting the ladles and doing all lighter work. Seven Morgan gas producers have been put down, and a gas engine by Erhardt & Sehmer, of Saarbrucken, is also nearly complete.

On the completion of the electric plant a Rateau blower capable of delivering about 30,000 cubic feet of free air per minute will be driven by a 1,000-horsepower electric motor, and the company proposes gradually to dispense with reciprocating engines by the substitution of electric driven blowers.

The erection of the cogging mill and finishing mill will follow in due course.

THE BRITANNIA WORKS OF DORMAN, LONG & CO., Ltd., MIDDLESBROUGH, ENGLAND[1]

The Britannia Works of the Dorman, Long & Co., Ltd., at Middlesbrough, comprise steel furnaces, rolling mills and constructional and bridge shops. The steel is made by the basic open-hearth process, and is rolled into sections of all descriptions for use by engineering, ship building, general constructional work and allied trades. The sections rolled include beams, 24 inches x 7½ inches to 4 inches x 3 inches; channels, 15 inches x 4 inches to 4 inches x 3 inches; angles, 8 inches x 8 inches to 3 inches x 3 inches; bulb angles, 11 inches x 3½ inches to 5½ inches x 3 inches and a number of special sections.

The average output of the steel furnaces per week is about 3,300 tons of ingots. The average output of the mills per week is about 2,800 tons of finished material, while the constructional shops have an average output of about 3,000 tons of finished work per month.

The equipment of the steel furnaces consists of 11 furnaces, two of 80 tons capacity, one of which has just recently been completed; three of 50 tons capacity and six of about 40 tons.

At one end of the furnaces is a gas fired mixer of 300 tons capacity, and at the other end of the shop, just nearing completion, is a gas fired mixer of 400 tons capacity. Molten metal is brought from the blast furnaces in ladles, charged to the mixers by 30-ton electric cranes and is drawn from the

CONSTRUCTIONAL DEPARTMENT OF BRITANNIA ROLLING MILLS, BRIDGE AND GIRDER DEPARTMENT.

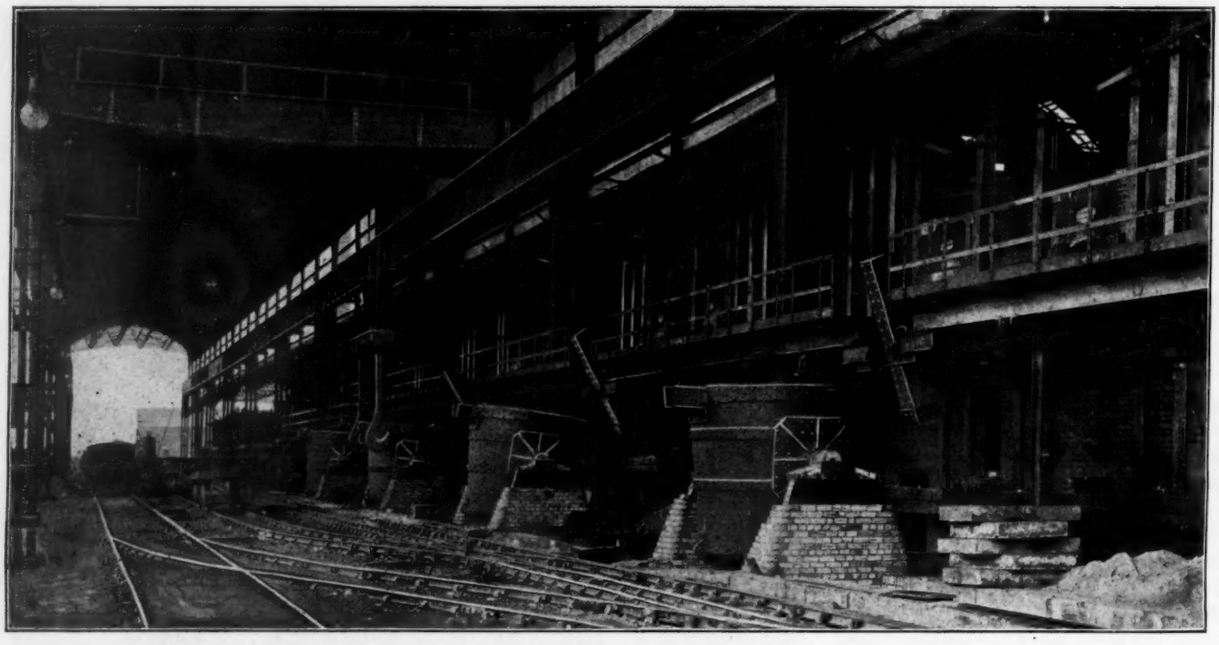
[1]One of the works visited by the Iron and Steel Institute at its recent Middlesbrough meeting.

mixers for use in the furnaces as required. The pig iron used is Cleveland iron. On the pit side, the method of teeming is from ladles into molds in the furnace pits. The molds are stripped by steam traveling cranes running on which charges and draws and handles its own doors. This crane is one of the few of its kind in Great Britain, though it is a type generally used in the United States and on the continent.

The cogging mill is a 40-inch mill mill. The cogging mill works continuously, but the finishing mills alternately; when one mill is in operation, rolls are being changed in the other mill.

The equipment of the mills is perhaps notable for the marine three-cylin-

Overhead Charging Machine at Britannia Mill Furnaces.



Open-Hearth Plant, Britannia Mill.

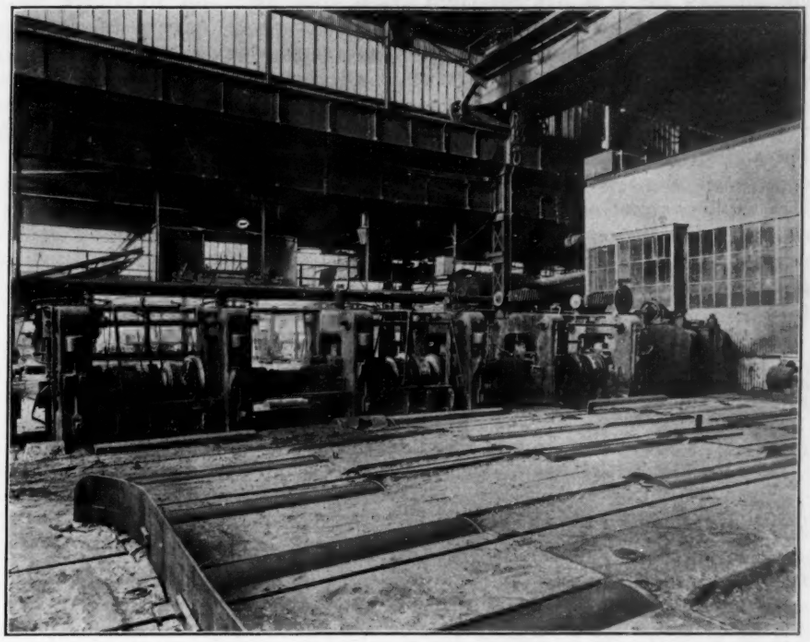
the tapping floor level, and after being stripped are placed on cars and run to the soaking pits.

The soaking pits are of both types, gas fired and coal fired, served with a single crane, of the overhead type, serving two finishing mills, one a 32-inch mill and the other a 29-inch mill all of the two high type. All blooms from the cogging mill are sent to the wash heating furnaces and are reheated before rolling in the finishing

der type of engine driving the finishing mills. This is of 16,000 horsepower. The mills are equipped with overhead electric cranes for all roll changing.

The improvement just about completed in connection with the steel furnaces,

involving the construction of an 80-ton steel furnace and a 400-ton mixer, including an overhead charging machine having both a vertical lift and rocking motion in the charging arm, it is thought involves the most modern and up-to-date practice.



No. 1 Mill, Britannia Rolling Mill.

The constructional and bridge department is claimed to be the best equipped shop of its nature in Great Britain, and to have no equal on the continent. The shops are 540 feet long, consist of four bays, three of which are 65 feet wide and one 75 feet wide, with several lean-tos for special work. Each bay of the main shop is commanded by two fast traveling overhead electric cranes, besides independent small cranes. Many novel features and improvements have been incorporated during the past five years. It is equipped with the most modern tools, mostly having independent motor drives. The shops are provided with the latest pneumatic and hydraulic appliances, one duplex air compressor, with a capacity of 1,200 cubic feet of free air per minute supplying the air, while the hydraulic pressure of 800 pounds per square inch is furnished by a motor-driven three-throw pump. The shops are well lighted; the current for both lighting and power purposes coming from the company's own central station at the steel works.

THE FUTURE DEVELOPMENT OF THE MIXER AND THE OPEN HEARTH PROCESS[1]

By Arthur E. Pratt

The present paper has been written to indicate the possibility of largely extending the utility of the metal mixer in the near future, and the bearing of such developments on the open-hearth process.

The use of the metal mixer as a means of obtaining a uniform product for the converter or open-hearth furnace is now practically universal. The purifying action of the mixer has long been known, and has been studied by various investigators.

The metal mixer is at present employed mainly for the following purposes, viz.: (1) To save remelting. (2) To secure a constant stock of metal of uniform composition. (3) In special cases to effect desulphurization by the use of high manganese metal. (4) In all cases there is a certain amount of purification, in addition to uniformity, but this is usually an incidental advantage rather than one of the definite objects of the mixer.

Very little appears to have been done to increase this natural purifying action of the mixer to any considerable extent—in fact, to make partial purification in all cases one of the definite objects of the mixer, instead of a rather fortunate incidental advantage.

Evolution of the Modern Mixer.

A feature of the evolution of the mixer, besides the growth in capacity and the changes in design, is the application of external heat. This was done to prevent the metal setting, and to keep it melted for any desired length of time. With the converter-shaped mixers an oil or gas blow pipe was, and is, found sufficient. The cylindrical, or open-hearth mixers, however, are fired by gas through movable "heads" in a similar way to a tipping open-hearth furnace. The air supplied through these heads is often regenerated, and sometimes the gas also. Producer gas is generally used, but blast furnace gas has been proposed, while in America natural gas is commonly employed. The advantage of this artificial heating, beyond its original purpose of preventing setting, is that cold metal may be added in the mixer, and melted down when required. Thus at Clairton, Pa., the mixer was designed to melt down about 20 per cent of scrap. In cases where much scrap melting is done, the heads or port ends and also the body, or cone ends of the mixer are provided with cooling blocks or rings. In such cases, representing the most recent practice, it is also usual to regenerate both gas and air.

The mixer was at first used solely for Bessemer work. It was not until 1900 that the use of fluid metal for open-hearth work began to be adopted, and the use of the mixer in this direction subsequently extended. The metal mixer is now used equally for Bessemer and open-hearth work, its utility as a means of obtaining uniformity of metal for both processes being universally recognized.

The resemblance between the latest gas-fired mixers and the modern tilting open-hearth furnace is very striking, and it is, indeed, a matter of sur-

[1]Abstract of a paper presented at the Middlesbrough (1908) meeting of the British Iron and Steel Institute.

prise to find that, of two "furnaces" so nearly identical, one should be turning out finished steel and the other acting as a metal store. In some cases the metal mixer actually is a tilting open-hearth furnace used as a mixer instead of a steel furnace.

Purifying Action of the Mixer.

Attention was first drawn to the purifying action of the metal mixer by Massenez. At Hoerde the mixer was used specially for desulphurizing, which was effected by the use of high manganese metal, the main reaction being:

$$FeS + Mn = MnS + Fe.$$

The manganese sulphide formed in metal mixers in this way rises and forms a slag, which is partly oxidized to manganous oxide and sulphur dioxide. Some manganese, however, is reduced again and passes back into the bath and brings out another portion of sulphur, and so on—in fact, the manganese acts as a carrier for the sulphur. An average analysis of the mixer slag at Hoerde, illustrating these reactions, is quoted by Massenez:

	Per cent.
Manganese sulphide	28.01
Manganous oxide	20.23
Ferrous oxide	25.46
Silica	18.90
Lime	3.53
Magnesia	0.43

Analyses showing the sulphur elimination are also given in the paper. The average removal of sulphur at Hoerde has been given as 45 per cent. The removal of sulphur in this way takes place in all mixers, although not always under the favorable conditions of high manganese and low silicon obtaining at Hoerde. Even when not specially aimed at, however, it is a very useful incidental advantage of the mixer. In modern mixers under favorable conditions, however, up to 70 per cent or more of the sulphur may be eliminated. For example, in a gas-fired mixer of the tilting open-hearth type employed for basic work on metal averaging about 0.8 per cent manganese, the sulphur is reduced from an average of 0.14 per cent (with occasional samples up to 0.2 per cent) down to 0.05 per cent. This represents a removal of 64 per cent of the sulphur present.

The only other metalloid appreciably affected in the mixer is the silicon, although not to the same extent as the sulphur. A small amount of silicon is oxidized and fluxed by the oxides of iron and manganese formed during pouring, etc. The actual reduction in the silicon was stated by Cooper in the discussion on his paper to be not more than about 0.02 per cent, which refers to a non-heated mixer, where elimination was not specially aimed at. In the latest mixers, by using an oxidizing flame for heating, more silicon may be eliminated than was the case in the earlier forms where the only oxidation was obtained by splashing, etc. For a modern gas-fired mixer the average removal of silicon may be as high as 35 per cent or more. Details of the uniformity obtained and the removal of silicon in the mixer are given by E. J. Windsor Richards as follows:

ONE MIXER USED.

	Silicon. Per cent.
Average from furnaces	1.63
Average from mixer	1.27
Amount removed	0.36
Percentage reduction	22.1

TWO MIXERS USED.

	Silicon. Per cent.
Average from furnaces	1.69
Average from mixers	1.26
Amount removed	0.43
Percentage reduction	25.4

The usual lining of a metal mixer was of firebrick, but at Hoerde they found that, owing to the heat of oxidation of the manganese sulphide the firebrick was cut away along the slag line. A. Knaff quotes the analyses of two samples of slag illustrating this action:

	Slag close to iron.	Upper part of slag.
	Per cent.	Per cent.
SiO_2	24.20	29.70
MnO	45.20	40.84
S	9.81	7.99
Fe	6.01	5.31

In one case the lining was reduced in three weeks from 350 millimeters to 170 millimeters, and the roof and funnel were also affected. A basic lining of magnesite bricks was therefore adopted, with most satisfactory results, the mixer being used for about nine months continuously with only slight repairs. The use of magnesite bricks and dolomite for lining the body of the metal mixer has also been adopted at other places where basic steel is made, and is now, in fact, quite usual. Basic lined mixers are provided with doors on both sides to facilitate inspection and repair of the lining, as well as for charging scrap.

The object of these two sections of the paper has been to bring forward certain salient points in regard to the metal mixer. It will be well to summarize these points at the present stage, as they have an important bearing on what follows:

1. The mixer has undergone a great increase in capacity. 2. Its use has spread from Bessemer to open-hearth work. 3. It has undergone great modifications in design, and is now, in most cases, essentially a gas-fired, tipping, open-hearth furnace. 4. It has not undergone any extension of utility at all corresponding to its modified design and capacity. The only extensions of utility it has undergone at present are (a) that it is used to a limited extent as a scrap melter, and (b) that a higher elimination of silicon is obtainable. It is the object of the following to indicate how the utility of the mixer may be further extended. It is proposed regularly to effect in the mixer a much greater preliminary purification of the metal than is usually the case in present practice, a proceeding to which the design of the modern mixer particularly lends itself. It is proposed to show, in effect, that the mixer has two functions—(1) mechanical, as a metal store and a mixing vessel to secure uniform composition; (2) chemical, as a refinery to secure the optimum composition of metal for conversion into steel, this second function being as essential to efficient steel making as the first. Further, the future of the metal mixer is inevitably bound up with the future of the open-hearth process, in which, when its chemical function is fully developed, it will play an important and indispensable part.

Increased Purification in the Mixer.

The author suggests that an increased elimination of impurities in the modern metal mixer may with advantage be obtained by maintaining therein a cover of basic oxidizing slag, to which, if necessary, additions of calcium chloride, fluor-spar, etc., are made to increase the fluidity. Oxides and lime are added to the slag from time to time to maintain its oxidizing and basic nature and to replace portions of foul slag which are poured off. Such a slag will act as a refining agent while the mixer metal is waiting to be taken away for further treatment, serving partly as a "washer" for the charges of blast furnace metal and partly in the same way as the slag in an ordinary basic open-hearth furnace. Silicon, manganese, phosphorus, and sulphur will be eliminated in amounts depending on the quantity and quality of the slag and of the metal charged. A small amount of carbon will also be removed. The present proposal is to apply the principles of the Talbot process to the ordinary mixer, not for the purpose of making steel, but for the purpose of regularly standardizing the metal

which is to be further treated by any of the ordinary processes.

The average composition of the blast furnace or ladle metal will depend on the steel making process adopted, hence it will be well to consider in a general way the action of the mixer slag on typical metal for the four chief processes.

Acid Bessemer.

The present suggestion is practically valueless for acid Bessemer work, as the silicon, which would be the first to go, is required for the blow.

Acid Open-Hearth.

For this process, while sufficient silicon is required in the metal to form a cover of slag for the bath, excess of silicon is undesirable, as it forms a siliceous infusible slag which demands larger additions of oxide to insure fluidity. Hence it might well be of advantage to remove any excess of silicon in the mixer and at the same time still further lessen the small amounts of sulphur and phosphorus (which, be it noted, are not removed by the acid open-hearth process). By so doing the process would be shortened, there would be less loss of iron in the slag, and less sulphur and phosphorus in the finished metal.

Basic Bessemer.

By treating high phosphorus metal in the mixer in the manner suggested, the silicon and some of the manganese and sulphur could be eliminated, leaving most of the phosphorus and the carbon. Here, as elsewhere, the extent and nature of the elimination is controlled by the amount and quality of the slag present in the mixer. As the removal of sulphur in the basic Bessemer blow is somewhat irregular, it is obviously of advantage to increase the facilities for its elimination in the mixer. The removal of silicon and manganese in the mixer would shorten the blow, lessen the quantity of lime required in the converter, thus increasing the capacity for a given size, and give a higher percentage of phosphorus in the slag. It is, of course, understood that this preliminary purification is not to be carried so far as to endanger the heat of the blow. It would be particularly applicable to high silicon phosphoric metal which would otherwise be too siliceous for the ordinary basic Bessemer.

Basic Open-Hearth.

For this process the mixer may be used to completely desiliconize the metal, remove most of the sulphur and much of the manganese and phosphorus (according to the slag present), leaving most of the carbon unaffected. This would give a very suitable metal for the basic open-hearth process, which would be considerably shortened by the preliminary elimination. Less lime would also be required in the open-hearth furnace. The amount of phosphorus in the slag would depend on the extent of its preliminary removal in the mixer. If but little is thus removed, then a higher percentage would be obtained in the open-hearth slag than is the case in ordinary work, owing to the absence of the other metalloids. Such slag would have a correspondingly higher value for agricultural purposes, as is also the case with the basic Bessemer slag already noted. On the other hand, if most of the phosphorus undergoes preliminary removal, the clean slag from the open-hearth may be sent to the mixer, making such further additions of lime and oxide as may be necessary. A better quality of steel is obtainable the larger the proportion of phosphorus which undergoes preliminary removal.

General Considerations.

The whole object of this suggestion is to increase the utility of the mixer by performing in it the preliminary stages of the processes which its stock of metal is subsequently to undergo, or by making the metal more suitable for such processes by means of a preliminary purification. This purification may be regulated to a great extent by the amount and quality of the slag. Since the temperature in the mixer is low, the carbon will be but little affected until the other metalloids are practically gone, although it is not suggested that for ordinary work the process should be carried quite as far as this. In any case there will be a decrease in the ratio of metalloids to carbon, which is a desirable thing in open-hearth work. The reactions involved are exothermic, so that the heat in the mixer will be well maintained, and the metal will run no danger of setting. The mixer also being gas fired, the necessary heat for heating up the lime and oxides for slag formation, etc., is readily obtainable. The lining of the mixer should be of basic material, since fire clay, being slightly acid, would be cut away by the slag. Foul slag can, of course, be poured off at any time, and fresh slag made or added from the open-hearth. With regard to carbon, owing to the low temperature and the endothermic nature of its reactions with oxides of iron very little carbon will be eliminated. As the object is to retain as much carbon as possible for later treatment, together with the other metalloids in such quantities as may be convenient, undue amounts of oxides should not be present. Oxide additions in excess would tend to promote reaction with the carbon, which reaction being highly endothermic, would chill the metal, although, as already noted, it is doubtful if this reaction would take place to any extent at the low temperature of the mixer.

The degree of uniformity attainable in the mixer would certainly be as great as is the case at present, and probably greater owing to the control obtainable by making variations in the slag and temperature of the mixer. With regard to the temperature, this would be rather higher than that of an ordinary mixer, being about that of the first stages of the basic open-hearth process when it is desired to remove the phosphorus prior to the carbon. The temperature should never approach the finishing temperature of an open-hearth furnace.

One of the serious drawbacks of the Bessemer process is the very irregular nature of its product owing to the great rapidity of the work. The metal is blown, recarburized and cast in a few minutes, and there is a lack of that control which is obtainable with the more leisurely open-hearth process. This drawback may possibly be overcome by employing a mixer to render the metal regular after blowing as well as before. Several converters feed a small gas-fired mixer of about 150 tons capacity. The metal is partly recarburized before entering the mixer. In the mixer the product of several blows attains uniformity, and samples may be examined more carefully without danger of the metal setting. Twenty to 30 tons of metal are poured from the mixer into a casting ladle and further recarburized to the extent required in the finished metal. Fresh hot metal would be continually added as blown, and the metal from the mixer cast at about the same rate, the loss of heat by radiation being made up by the gas firing.

A New Steel Making Process.

The numerous modifications of the open-hearth process which have been devised or put into practice may be divided into two main classes, of which the Bertrand-Thiel and the Talbot processes may be taken as the best and most typical. The first class aims chiefly at improving the quality of the product by getting rid of the greater part of the foul slag at a certain stage of the process, and providing a clean slag for finishing. The

provision of a clean finishing slag is now recognized as a very important factor, and one which no future modification of the open-hearth process can afford to neglect.

The second class of modifications aims chiefly at increasing the rapidity of the process by facilitating the interaction of the metalloids and fluid oxides, usually by the "washing" action of an oxidizing basic slag. The Talbot continuous process has the additional advantage of securing continuity of work. The Monell process presents one feature of great interest, the significance of which will be seen later. This process consists in preheating the lime and ore to incipient fusion on the open-hearth, and then adding the furnace metal. During, or after the resulting reaction, the greater part of the slag is drawn off, and the bath of metal is then heated up to a high temperature before any further additions are made. In pouring furnace metal on to fused or semi-fused oxides and lime, the process is merely a washing process, but in withholding oxides until the bath has been raised from a low to a high temperature the process introduces a new principle. The rapid interaction of the metalloids and oxides is also one of the features which will inevitably be embodied in the open-hearth process of the future, as will the increased yield which many of the existing modifications attain.

The author has devised a modification of the open-hearth process which embodies certain good features of existing processes, but is based on entirely new principles, and possesses advantages not to be found in any existing process. The suggested process is an attempt to anticipate the next five years of progress in open-hearth practice.

In the ordinary open-hearth process, whether acid or basic, three main periods may be distinguished, viz.: (1) The melting down period during which scrap, with or without solid pig, is melted down in the open-hearth furnace. (2) The low temperature or exothermic reaction period during which a portion of the metalloids other than carbon, together with a small amount of the carbon, are eliminated. The temperature is gradually raised to bring on (3) the high temperature or endothermic reaction period during which the greater portion of the carbon and the remaining amounts of the other metalloids are eliminated. In the ordinary process these periods follow and merge into one another, and are conducted in one furnace which is heated up through the whole range of temperature between the commencement of the process and the casting temperature. Hence an intermediate period between (2) and (3) may also be distinguished during which a considerable amount both of the carbon and of the other metalloids are eliminated together. In ordinary work this "intermediate" period during which the two classes of reactions overlap occupies the greater part of the whole process.

In a bath of metal containing carbon and the other usual metalloids, all the metalloids except carbon give the most complete and rapid reduction of the added oxides when the bath is at comparatively low temperatures. Carbon, on the other hand, gives the most complete and rapid reduction only at high temperatures, while at intermediate temperatures the reduction effected, both by carbon and the other metalloids, is very incomplete and slow.

Since the more complete the reduction the higher the yield, this intermediate period is inefficient. Any process, therefore, in which the bath of metal is raised from a low to a high temperature while elimination is taking place is not working efficiently, since it must necessarily pass through this intermediate period. On the other hand, if the oxidizing slag is withdrawn and no further additions of oxide are made until a high temperature is attained, time is wasted in heating up the bath of metal. Further, it is clear from the above considerations that any process in which, for example, both the carbon and the phosphorus in the bath of metal are eliminated at the same time will not give so satisfactory a reduction of oxides as when these elements are eliminated independently. One of the objects of the author's method of work is to avoid this intermediate and inefficient period, to attain the requisite high temperature without delay, and, further, to avoid the elimination of carbon and the other metalloids together as far as possible. As already noted, in the ordinary process the three chief periods follow and merge into one another, but it is readily demonstrated that if these periods are completely separated and are carried out simultaneously and independently, a much greater rapidity of work is possible than is the case when all or some of the periods are carried out *seriatim*.

The combination of these two broad principles, (viz., that of keeping the exo- and endothermic reactions quite distinct and that of performing the three periods of the process simultaneously and independently) forms what the author terms the "principle of specialization," and no modification of the open-hearth process can approach finality which does not embody this principle.

In working according to this method three types of furnace are employed, viz.: (1) a large gas-fired metal mixer of modern type or a large tilting open-hearth furnace, known as the "finer," to receive charges of blast furnace or cupola metal as they are tapped, or it may take charges from an ordinary metal mixer. In this there is maintained a cover of basic oxidizing slag, lime and oxides being added from time to time to replace portions of foul slag which are poured off. This slag is employed for washing and refining the metal, and serves to eliminate part of the metalloids. The finer should be maintained at such a comparatively low temperature, that as much of the silicon, manganese, sulphur, and phosphorus as possible is eliminated without the removal of much of the carbon.

(2) A furnace, known as the "scrapper," of similar design to the finer, but having a large heat supply so as to work at very high temperatures. The scrapper is used for melting down scrap and heating it in its molten condition to a very high temperature. Scrap is charged continuously, in small portions at a time, into the molten scrap which is already in the scrapper and is thus melted.

(3) A series of furnaces, known as "finishers." These are ordinary open-hearth furnaces, either fixed or tipping, which are employed for making the finished steel from charges of finer metal and fluid scrap in the following manner.

In working according to this arrangement, a charge of molten scrap is conveyed from the scrapper and charged into one of the finishers. Oxides and lime are then added, or they may be charged before adding the scrap. It is preferable for the lime and oxides to be preheated together in a special furnace, or they may be charged into the scrapper and preheated there, being subsequently charged into the finisher with the molten scrap. The scrap, lime, and oxides being already in the finisher, a charge of finer metal is then added. Owing to the store of heat contained in the molten scrap, a violent reaction occurs between the carbon in the finer metal and the molten oxides, the carbon together with any small amounts of the other metalloids being rapidly

eliminated. The rapidity of work is further increased when the necessary oxides are preheated in the scrapper as, under these conditions, the oxides dissolve in and impregnate the charge of fluid scrap and thus allow of very intimate mixture with the metalloids. The bath of metal is then finished in the usual way by such further additions as may be required, and is tapped completely out of the furnace.

It is highly desirable for the proper working of this process that a sufficient store of heat is available to give a rapid reaction between the carbon and the fluid oxides and thus to avoid the "intermediate" reactions which are slower and less efficient. This is done by maintaining the metal in the scrapper at as high a temperature as is practicable, so that the heat required is drawn from that contained in the charge of scrap which is conveyed to the finisher.

When the available scrap is insufficient to supply this heat, a certain quantity of the finer metal may be charged into the scrapper, and heated up with the molten scrap so as to make up the necessary bulk of highly heated metal. When this is done, however, oxides should not be present in the scrapper, as they would react prematurely with the carbon in the added finer metal and tend to chill the metal. On the other hand, when ample scrap is available it may be carburized in the scrapper so as to further increase the yield in the finisher.

The above process is eminently suitable where reasonable amounts of scrap are available. It may, however, be carried out when no scrap can be obtained. In this case there are two alternative methods. The first is to use a Talbot furnace for the finisher and work it on the continuous system. The other alternative, which enables the whole of the finished charge to be tapped instead of only a portion, is as follows: The scrapper is termed the heater and is charged with finer metal, which it heats to a high temperature in the absence of oxides. The finishers in this case take charges from the heater, or from both heater and finer. In order to prevent the reaction being too violent, owing to the comparatively large amount of carbon present in the metal, oxides should be added in the finishers in portions, and not all at once, and the charges may also be added in portions, while it is advisable to use finishers with a deep bed. Owing to the store of heat available, and to the preliminary fining, the reactions will be extremely rapid, and the whole process will compare very favorably with the ordinary "pig-and-ore" process.

The first thing that calls for notice is the use of fluid scrap, in the manner suggested. It is at present the custom to melt down the scrap in the open-hearth furnace. This involves a waste of much time and labor, even with the use of expensive charging machines, not only in charging, but in waiting for the charge to melt. Further, it serves to diminish the yield, for the scrap becomes oxidized in melting down, so that less oxides are needed to eliminate the metalloids, and hence less iron is reduced into the bath. By charging all the scrap into one furnace and melting it there, the scrap may be readily conveyed by ladle in the fluid state to the open-hearth furnaces, thus saving considerable time and labor, and affording a constant stock which can be drawn from as required. Furthermore, there is no oxidation due to exposure during melting, the scrap being plunged at once into a bath of highly heated fluid metal in which it quickly melts. The destructive action due to melting down on the furnace bed is also avoided. In the process already described, this method of utilizing fluid scrap has also a further important object. In order to obtain a rapid and efficient carbon elimination it is necessary to provide a store of heat in the metal itself rather than to rely on the comparatively slow heating power of the furnace. By utilizing fluid scrap it may be heated up in the scrapper so as to provide the store of heat which is required, and hence the whole of the charge may be tapped from the open hearth when finished. To summarize, the advantages of using a scrapper and pre-heated fluid scrap in the manner described are (1) a saving in time and labor; (2) a higher yield; (3) more rapid reactions in the open hearth.

The importance of keeping the exothermic and endothermic reactions distinct is illustrated by a point in ordinary basic open-hearth practice. In the earlier stages of this process, if the temperature becomes too high, the carbon is eliminated before the phosphorus, causing much trouble and delay. Phosphorus is eliminated by an exothermic reaction and carbon by an endothermic, and for the proper working of the process the exothermic reaction should be performed before the endothermic at a low temperature, and not both together at a high temperature. In applying the principle of separation as already outlined, it should be noted that all the low temperature reactions take place in the finer, which is kept at a low temperature. The net result of these reactions being exothermic, there is little danger of chilling the metal, while, since the finer is gas fired, ample heat is available for heating up the added oxides and lime, etc. On the other hand, the endothermic reactions between the carbon and the oxides take place in the open-hearth furnace or "finisher" under high temperature conditions, the necessary store of heat being provided by the charge of highly preheated fluid scrap from the "scrapper."

In the author's process, the three chief periods of the open-hearth process occur simultaneously each in a separate furnace under the best working conditions. This does not involve three furnaces instead of one, the fact being that each furnace specializes in one period instead of performing all three in turn. For instance, a plant consisting of finer, scrapper, and five finishers, working the author's process would compare with a plant consisting of a mixer and five open-hearth furnaces working the ordinary process. The difference would be that the former plant would turn out the same quantity of finished metal in considerably less time, and so have a much greater output. In the plant working the ordinary process, each of the five furnaces would have to run through the three periods in turn, and would also waste time in heating up the bath of metal, etc. In the author's plant each of the five furnaces deals with the last period only, and loses no time in waiting or heating up, and even shortens the period, owing to the promotion of a sharp ore reaction. The only extra piece of apparatus is the scrapper, the advantages of which have already been pointed out.

One further point with regard to specialization may be referred to. If the practical difficulties involved could be overcome, it would be better to preheat the ore and limestone to the point of incipient fusion in a special furnace or cupola, and add them in this state to the charge of scrap in the finisher. In this semi-fluid and intimately mixed state they are in the best condition for obtaining the desired reaction, and by independent heating there is no demand on the store of heat which is required for the endothermic reactions. This sug-

gestion has already been made, but no attempts seem to have been made to carry it out.

It is recognized that a rapid intermixture of furnace metal with fluid oxides and basic slag, whether by a washing process or otherwise, gives a greater yield owing to the more complete reduction of oxides by the metalloids, and also considerably shortens the process. Therefore all efforts to improve the open-hearth process in the future must take this factor into consideration. In the process under discussion it should be noted that this washing action takes place both in the finer and in the finisher, and that there is every facility for obtaining the increased yield due to the reaction in question. The reaction with the slag is also facilitated as in the Talbot and similar processes by the fact that the added metal is of less specific gravity than the bulk of the metal already in the furnace, and so tends to form a layer immediately beneath the slag, by which the reaction is greatly promoted.

The question of slag now requires consideration. It is now well recognized that the removal of foul slag half way through the process and the making of a clean finishing slag enables a much better quality of steel to be made, particularly with respect to freedom from phosphorus. In the author's process this principle of having a clean slag for the final stages is carried out by removing a large proportion of the metalloids in the finer, thus enabling a very clean finishing slag to be obtained in the finisher. Another point with regard to slag is its bulk. A thick layer of slag is extremely non-conducting, and, when present, renders it very difficult for the flame of the furnace to heat up the bath of metal. The thinner the covering of slag that can be got to do the necessary work, the more efficiently will the furnace work. In the process under discussion this principle, also, is perfectly carried out. In the finer only sufficient slag is present to purify each charge of furnace metal, and, since the charges are relatively small as compared with the bulk of metal present, the covering of slag will be thin. In the finisher the amounts of metalloids to be removed by the slag are comparatively small, so that, again, only a thin cover is necessary. The action of an oxidizing basic slag on the furnace bottom is extremely deleterious, and hence the entire use of fluid metal and scrap and the avoidance of a melting down period or of the preheating of such a slag directly on the furnace bottom makes for a long furnace campaign.

The author summarizes the advantages of his process as follows, viz.:

1. Continuity. The finer and scrapper are worked on continuous principles, while the finishers have no periods of waiting or melting down, and thus are also continuously at work. 2. Increased yield due to greater reduction of oxides and absence of oxidation by air. 3. Rapid work and increased output for a given size of furnace, due to the principle of specialization, use of fluid metal and scrap, etc. 4. With high phosphorus metal the finer slag is valuable as a fertilizer. 5. Low labor costs, saving in fuel, and longer life of furnaces owing to the entire use of fluid metal and scrap and not cooling down the finishers by charging cold scrap. 6. High grade steel can be made from low grade metal, owing to the principle of specialization and keeping the foul slag away from the finishers. 7. Ordinary small-sized fixed open-hearth furnaces can be employed as finishers, and no large ladles or cranes are required. By employing small finishers tapping in rotation, a regular supply of steel to the mills at frequent intervals is obtained. 8. There is a constant stock both of molten scrap and partly refined mixer metal. No furnace is kept waiting while another is making bottom or refining a charge. The working of the charges is also under perfect control. 9. There is no dead soft metal locked up anywhere. As soon as the metal is dead soft it is tapped completely and a large portion is not reserved for contamination by a fresh charge of unrefined metal. 10. The conditions of temperature in all the furnaces are constant. There are no alternations of chilling and reheating with consequent waste of time and fuel due to performing low temperature and high temperature reactions, melting down, etc., all in the same furnace.

Thermo-Chemistry of Open-Hearth Reactions.

The following tables give the thermo-chemical equations of the chief reactions involved in the reduction of oxides in the open-hearth process.

In drawing up these tables it has been assumed for simplicity that the metalloids exist in the uncombined state in the metal, which, of course, is not the case. This assumption, however, does not affect the argument, as, in comparing one mode of reduction with another, the heat required to liberate the metalloids in question from their state of combination is a constant factor. Similarly the heat developed by the combination of the SiO_2, etc., in forming the slag has been ignored, as the same considerations apply. The further assumption has been made that all peroxide added to the bath is converted into the magnetic oxide. It will be seen from the thermal equation that this assumption is justified, and in any case the results are the same whether Fe_2O_3 or Fe_3O_4 is taken as the starting point.

Table I.

Formation of Magnetic Oxide.	Nature of Reaction.
(1) $4Fe_2O_3 + Fe = 3Fe_3O_4$; $4\times199{\cdot}4$; $3\times265{\cdot}8$; $797{\cdot}6$; $797{\cdot}4$	− 0·2
Reduction of Protoxide.	
(2) $2Fe_3O_4 + Si = 6FeO + SiO_2$; $531{\cdot}6$; $6\times66{\cdot}4$; $179{\cdot}6$; $398{\cdot}4$	+ 46·4
(3) $Fe_3O_4 + Mn = 3FeO + MnO$; $265{\cdot}8$; $199{\cdot}2$; $91{\cdot}0$	+ 24·4
(4) $5Fe_3O_4 + 2P = 15FeO + P_2O_5$; $1329{\cdot}0$; $996{\cdot}0$; $365{\cdot}2$	+ 31·2
(5) $Fe_3O_4 + C = 3FeO + CO$; $265{\cdot}8$; $199{\cdot}2$; $29{\cdot}4$	− 37·2

Table II.

Complete Reduction.	Nature of Reaction.
(6) $Fe_3O_4 + 2Si = 3Fe + 2SiO_2$; $265{\cdot}8$; $359{\cdot}2$	+ 93·4
(7) $Fe_3O_4 + 4Mn = 3Fe + 4MnO$; $265{\cdot}8$; $364{\cdot}0$	+ 98·2
(8) $5Fe_3O_4 + 8P = 15Fe + 4P_2O_5$; $1329{\cdot}0$; $1460{\cdot}8$	+ 131·8
(9) $Fe_3O_4 + 4C = 3Fe + 4CO$; $265{\cdot}8$; $117{\cdot}6$	− 148·2

Table III.

Reduction of Protoxide.	Nature of Reaction.
(10) $2FeO + Si = 2Fe + SiO_2$; $132{\cdot}8$; $179{\cdot}6$	+ 46·8
(11) $FeO + Mn = Fe + MnO$; $66{\cdot}4$; $91{\cdot}0$	+ 24·6
(12) $5FeO + 2P = 5Fe + P_2O_5$; $332{\cdot}0$; $365{\cdot}2$	+ 33·2
(13) $FeO + C = Fe + CO$; $66{\cdot}4$; $29{\cdot}4$	− 37·0
Oxidation of Protoxide.	
(14) $3FeO + O = Fe_3O_4$; $199{\cdot}2$; $265{\cdot}8$	+ 66·6
(15) $FeO + Fe_2O_3 = Fe_3O_4$; $66{\cdot}4$; $199{\cdot}4$; $265{\cdot}8$	+ 0·0
(16) $3FeO + CO_2 = Fe_3O_4 + CO$; $199{\cdot}2$; 97 ; $265{\cdot}8$; $29{\cdot}4$	− 1·0

A careful consideration of these tables will give a perfect explanation of the various phenomena of variation in yield and rapidity of elimination at different temperatures in the open-hearth furnace, and will show the prime importance of the principle of specialization when a process of maximum efficiency is required.

Considering first the reactions at a low temperature, but little above the melting point, it is clear from the endothermic nature of the carbon reactions that very little or no carbon will be eliminated. This agrees with practice, as it is will known that when

working at low temperatures practically no carbon is removed.[2] With regard to the other metalloids there is no doubt as to their removal, but the question is as to whether the reduction effected by them is complete as in Table II, or only partial as in Table I, or whether it proceeds in stages as in Tables I and III. As complete reduction (Table II) gives the most exothermic reactions, it would appear that these reactions are what occur. However, the question of mass comes into play. If relatively large quantities of ore are present, there is little doubt, since a given quantity of metalloid will reduce four times as much ore to protoxide as to metal with the same evolution of heat, that a considerable amount of reduction to protoxide will take place (see Tables I and II). The protoxide, however, being thus produced will be to a great extent further reduced to metal, since in this case there is exactly the same inducement for the metalloids to reduce the protoxide to metal as the magnetic oxide to protoxide (the quantities involved being the same and the reactions being approximately equally endothermic—see Tables I and III). Since in practice it is not possible to have theoretical amounts of ore present, we may assume that at low temperatures the nature of the reduction effected by the silicon, manganese, and phosphorus is (1) partly complete as in Table II; (2) partly by stages as in Tables I and III; and that (3) a portion of the FeO produced in the first stage of reduction is oxidized by the air to Fe_3O_4, as in equation 14, Table III, this reaction being more exothermic than those of further reduction. Owing to the last factor the yield is diminished and cannot, in practical work, approximate to the theoretical amount. This latter point also shows that, except in rapid work ("washing" processes), an undue excess of oxides may have a prejudicial effect on the yield.

The reduction effected at what may be termed "intermediate" temperatures may now be considered. These are the temperatures at which carbon begins to be eliminated. It will be noticed in the tables that all the equations referring to carbon are endothermic. That is, it is necessary to draw upon a store of heat for their maintenance, and, clearly, the reaction which will be the first to take place is the one which makes least demand on the heat supply, i. e., the least endothermic. This is the reaction given in equation 5, Table I, which is the one that takes place at these temperatures. The protoxide thus formed is not reduced further, as in equation 13, Table III, since there is equal inducement for the carbon to remove more magnetic oxide (equation 5, Table I), while there is considerably greater inducement for the protoxide to become oxidized by air (equation 14, Table III), or to combine with any added peroxide (equation 15, Table III). Hence complete reduction is, practically speaking, never effected by carbon at these temperatures. With respect to the other metalloids, the state of affairs is equally unsatisfactory. The endothermic nature of the carbon reaction inhibits complete reduction by the other metalloids, appropriating to itself the difference in heat between partial and complete reduction. A further tendency making reduction only partial is the more exothermic reaction between the protoxide and the air. Thus, although a small amount of reduction to metal by two stages may take place, the greater part of the reduction at the temperatures in question is incomplete, and oxidation is mainly effected by air through the medium of the carrying action of the oxides. The oxygen carrier may be a silicate of iron, but it is more probably the excess of oxide above that required to satisfy the silica in the slag. At these temperatures, in fact, the yield is at its minimum. The air oxidation is facilitated by the circulation promoted by the evolution of carbon monoxide which brings the partly reduced oxide to the surface and into contact with the air.

At high temperatures there is sufficient store of heat for the more endothermic carbon reaction to take place, i. e., the carbon effects complete reduction as in equation 9, Table II, and thus increases the yield. The inhibiting action, however, will be still stronger, so that the other metalloids will only effect partial reduction, the protoxide formed being oxidized by the air to magnetic oxide, part of which will then be completely reduced by the carbon, while the rest is again partially reduced by the other metalloids. Thus only carbon makes any addition to the yield at high temperatures.

In passing from a low to a high temperature, then, the nature of the reduction which is effected by carbon and the other metalloids respectively undergoes a gradual change. In the case of carbon reduction does not take place at all at low temperatures, is only partial at intermediate temperatures, and becomes complete only at high temperatures. In the case of the other metalloids reduction is complete at low temperatures and becomes more and more partial as the temperature rises, and is entirely partial at high temperatures. Since the yield is only increased when complete reduction takes place, it is clear that the maximum yield can only be obtained if all the metalloids except carbon are eliminated at the lowest practicable temperature, if carbon is then eliminated at the highest practicable temperature, and if intermediate temperatures are completely omitted. This is precisely what the author effects by applying the principle of specialization in the process he has described.

The question of yield having been dealt with, there remains the consideration of the bearing of these ore reactions on rapidity. On comparing Tables I and II it will be seen that for the same quantity of oxide four times the amount of each metalloid is eliminated when complete reduction takes place as when the reduction is only partial. Hence when complete reduction occurs the elimination will be at least four times as rapid. Complete reduction occurring in two stages is less rapid, since for the same elimination two reactions must take place instead of one, while the factor of air oxidation intervenes and tends to lessen the extent of the second stage of reduction. Thus the greatest rapidity is attained when the reduction is effected to as great an extent as possible according to Table II. This again can only be done by eliminating the silicon, manganese, phosphorus and sulphur at the lowest practicable temperature, then eliminating carbon at the highest practical temperature, and omitting intermediate temperatures altogether. As already noted with regard to the yield, these conditions are carried out, as effectively as practical considerations will allow, in the author's process, which thus fulfills the requirements for a maximum yield in a minimum time.

Diagrams Illustrating the Principle of Specialization.

This appendix has been added with the object of presenting in a diagrammatic form some of the conclusions of the foregoing paper. The diagrams herewith are intended to represent

[2]This refers to practice where fluid metal is employed. With solid pig, some carbon is removed by air-oxidation during the melting down stage.

typical or average results and must not be taken to mean any particular practice or special set of experimental data, as they are only for the purpose of giving a graphical illustration of the principles enunciated.

In the first diagram are curves showing the manner in which the nature of the reduction effected respectively by carbon and the other metalloids varies with the temperature during the ordinary open-hearth process. The nature of this variation has already been explained and the diagram demonstrates its importance very effectively and shows the inefficiency of the intermediate period. It should be noted that the curves do not indicate the quantities of metalloids removed but the manner in which the removal is effected.

Fig. 2 illustrates how the efficiency of the process is increased by omitting the intermediate period. In this case the greater part of the carbon and of the other metalloids is removed at the highest parts of their respective curves, so that the completeness of the reduction is at a maximum. In the author's process the two periods occur simultaneously in different furnaces, so that, as far as time is concerned, the two parts of the diagram should be superposed.

Figs. 3 and 4 show the effect of specialization on the time and the temperature of the open-hearth process. In the ordinary process, commencing from the time when the charge is fluid after being melted down, the temperature increases at a more or less constant rate until the time of tapping. In the specialized process the temperature in each furnace is practically constant, and is maintained at the most suitable point for carrying out the operations in question. The temperature curves of the finer and scrapper will undergo small regular undulations, representing charges of furnace metal and scrap, while the nature of the curve for the finishers will depend largely upon the quantity of scrap employed. On mixing the finer metal and fluid scrap a mean temperature will be attained depending upon their respective proportions and initial temperatures. With a fair proportion of scrap this temperature will be sufficiently high to compensate, with the heating power of the furnace, for the chilling effect of the carbon reactions, so that the curve will be an approximately straight line somewhere near the casting temperature. As regards the time, owing to the periods being performed simultaneously, the time occupied will be that of the longest period. In practice the time for each charge will be that taken in the finishers, which will be about one-third, or less, of that occupied by the ordinary process.

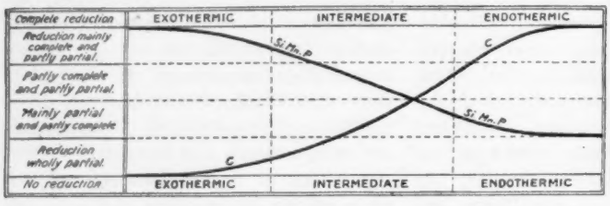


FIG. 1—NATURE OF REDUCTION EFFECTED BY THE METALLOIDS IN ORDINARY OPEN-HEARTH PROCESS.

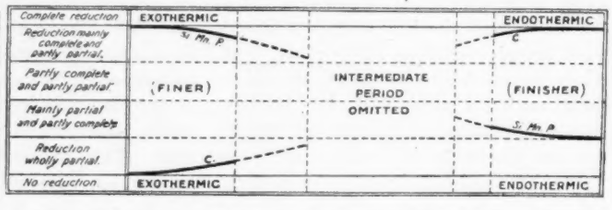


FIG. 2—NATURE OF REDUCTION IN THE SPECIALIZED PROCESS.

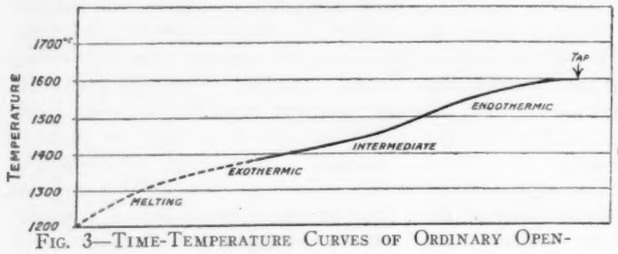


FIG. 3—TIME-TEMPERATURE CURVES OF ORDINARY OPEN-HEARTH PROCESS.

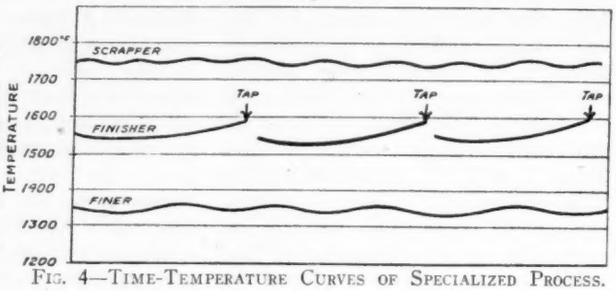


FIG. 4—TIME-TEMPERATURE CURVES OF SPECIALIZED PROCESS.

The C. & G. Cooper Co., Mt. Vernon, N. Y., is installing two tandem compound steam engines of 3,000 horsepower each in the Braddock, Pa., plant of the American Steel & Wire Co. The Cooper company is also placing a 4,000 horsepower tandem compound engine at the rail mill of the Edgar Thomson works of the Carnegie Steel Co.

POSSIBLE ECONOMIES IN LUBRICATING OILS.

A recent investigation of the quantity, quality and cost of oils used by various mills indicate conditions so varied as to point the moral of the value of expert advice in their purchase. In this case, Arthur D. Little, chemist, of Boston, by whose courtesy the results and conclusions are presented, found a range in the cost of machine, engine and special oils (exclusive of cylinder oils) from 14 to 48 cents per gallon, as appears from the following table.

Name.	Price, cents.	Sp. Gr.	Flash.	Fire.	Cold.
Machine	14	0.872	399	464	36
Machine "A" ..	16	0.872	388	462	36
Machine	14	0.926	329	361	28
Machine	15	0.932	352	385	17
Engine	23	0.914	410	470	8
Engine "B"....	25	0.861	414	467	8
Special engine..	48	0.907	405	446	10
Signal oil	45	0.845	265	283	39
Crank case	18	0.877	514	590	29

The real value of the oil is shown by the constants revealed by the investigation. With qualities almost identical there is material variation in the price, as for instance between the first and second samples, and between the different engine oils. Mr. Little's opinion, based on extended experience in similar cases, was that 12 cents per gallon would be a fair price for these oils taken as a whole. At this figure the mills investigated would be able to save nearly $1,200 per year by the use of the cheaper oil without detrimental results.

A new 75-horsepower engine has been installed in the water works plant at Monroe, Wis., by the Allis-Chalmers Co., Milwaukee.

A "BLISS" AUTOMATIC SIDE SEAMING MACHINE.

In the accompanying illustration are shown two views of an automatic side seaming machine recently designed and built by the E. W. Bliss Co., No. 8 Adams street, Brooklyn, N. Y. The machine at one revolution forms and closes a seam such as is shown in Fig. 3. This seam is being accepted as the best type to use where, in order to insure the absolute exclusion of moisture from the goods to be packed in a can, a strong seam of extra tightness is required. In packing for shipment such chemicals as chloride of lime, caustic soda and bleaching powder, cans with this type seam are used almost exclusively.

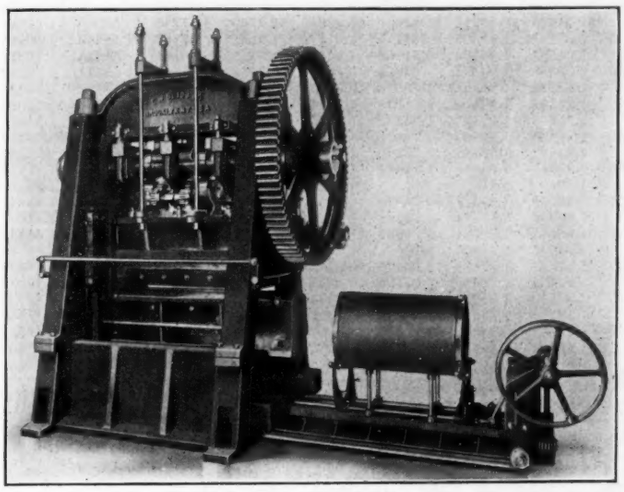


FIG. 1—FRONT OF BLISS DOUBLE SEAMING PRESS WITH CAM ON CARRIAGE.

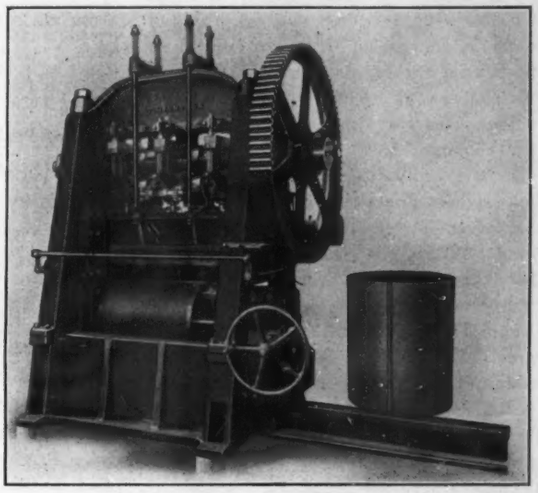


FIG. 2—DOUBLE SEAMING PRESS WITH CAM IN POSITION IN PRESS.

The machine is provided with a movable carriage in which the rolled body blank is clamped between rings, which, in addition to carrying the blank into position over the forming horn, serves the purpose of retaining the correct diameter of body required to insure a good fit of top and bottom in the locked can. The clamping rings are also fitted with a gage which enables the operator to set his blank so that the finished seam will not have too long an end extending on the outside of can. When the body blank is clamped in position, the carriage, by means of the large hand wheel on its end, is moved and the body forced over the horn, and into position, the end support for the horn also being carried on the moving carriage. It takes but a few seconds to place and clamp the body and possibly five seconds more to turn the hand wheel to carry the body under the slide ready to form the seam.

The machine is geared with a ratio of 7 2/3 : 1 and is double acting. The crank shaft has three cranks of 1-inch stroke which operate the inside ram for the second stage of the seam. The outer slide has ½-inch movement and, operated by two cams on the crank shaft, forms the first stage of the seam. The horn on which the can is seamed has a sliding blade operated by a cam from the end of the crank shaft. To make the first stage of the seam this blade is raised above the top surface of the horn in position for the outer slide to do the forming, after which it drops to a lower position and the inside ram, following down, completes the seam. The carriage is then withdrawn and the finishing can taken out. The machine shown will seam cans from 21 inches to 30 inches diameter, and up to 40 inches extreme length, handling stock from No. 28 to No. 20 Birmingham wire gage in thickness.

FIG. 3—SECTIONAL VIEW OF SEAM.

Austenite and Manganese Steel.—Ed. Maurer has recently obtained pure austenite, the solid solution of carbon in iron discovered by Floris Osmond, which has hitherto only been obtained as an alloy with manganese steel containing 13 per cent of manganese, and nickel steel containing 25 per cent of nickel. Osmond obtained his best specimen from a cementation steel containing 1.6 per cent of carbon, and this was composed of two-thirds of austenite and one-third of martensite. Maurer heated three specimens of steel containing the following percentages to 1,050 degrees Cent. for 15 minutes and then tempered them in ice water.

	First.	Second.	Third.
Carbon	1.21	1.18	1.94
Silicon	0.28	0.88	0.94
Manganese	....	1.83	2.20
Nickel	3.73	....	....

He found that the two first gave martensite, but the third gave pure austenite. On metallographic examination, the latter was found to be constituted of cells exhibiting well-defined maculae; it is not magnetic, and its hardness is relatively low. It can be transformed into martensite, and thus considerably hardened by mechanical deformation at the ordinary temperature, by annealing at about 400 degrees Cent. or by immersion in liquid air. Similar treatment of a steel containing less manganese gives a metal consisting of both austenite and martensite. Henri Le Chatelier states that on one occasion he obtained homogeneous austenite by heating a steel containing 1.5 per cent of carbon and about 1 per cent of manganese for two hours at 1,200 degrees Cent. and tempering in a reducing medium; but, failing to determine the essential conditions, had never succeeded in repeating the operation. Maurer's discovery he regards is important, in that it facilitates the study of the properties of austenite normally stable only above 800 degrees Cent., and in that it furnishes a steel which is both cheaper and more readily worked than the manganese steel, used where great resistance to wear by friction is required, and the nickel steel employed on account of its extraordinary toughness.—*Engineering.*

TEMPERATURE OF COAL PILES.

The old method of determining the temperature of a coal pile by driving pipes and hanging thermometers in them has been greatly improved by means of a special coal auger designed and used by the coal department of the Arthur D. Little Laboratory, Boston. It is similar in form to that used in mines but is provided with a means of inserting a small maximum thermometer near the point. Extensions, 4 feet long (for convenience in carrying) may be attached to the auger so that the thermometer can be readily inserted into any depth in a pile. The point of the auger can be driven 20 feet in three to five minutes. About 10 minutes is required for the thermometer to attain the temperature of the surrounding coal. Temperatures taken in this manner are much more accurate than those obtained by hanging a thermometer down a pipe where there is more or less circulation of air making it impossible to locate the hottest spot. Temperatures obtained by means of the auger have been found to be 40 degrees Fahr. higher than by the pipe method.

RELATIVE VALUE OF COALS OF DIFFERENT THERMAL CONTENTS.

The Dilworth Coal Co., Pittsburg, has prepared a table upon the relative value of a ton of coal at different selling prices according to the heat units contained. The computation is based on the number of British thermal units, taking 13,000 B. T. U. as the standard. In connection with its advocacy of the purchase of coal on a heat unit basis, the company treats the subject in a circular to the trade as follows:

"Moisture and ash are the two elements that reduce the heat units, and are not only valueless as fuel but costly to eliminate from the combustibles in the coal, the moisture taking power to expel it equal to 20 pounds of coal per ton for each per cent, and the inert ash taking labor, freight, etc., equal to 20 pounds of coal per ton for each per cent of ash it contains.

"All have been confronted with the vexed question: Is the best Pittsburg coal, which has 14,000 heat units, worth the difference in freight, and cheaper than 11,000 B. T. U. coals with excessive ash and moisture to expel, with say 35 cents per ton freight in its favor? We answer yes.

"We believe that the plan of buying coal on heat-unit tests and guarantee will be welcomed by consumers, as in addition to its obvious advantage, it will help to determine the frequently mooted question of the best form of furnace and conditions of combustion."

The table compiled by the company is as follows:

British Thermal Units.	Re'ative Values of a Ton of Coal When It Is Selling at									
	$2.00	$1.95	$1.90	$1.85	$1.75	$1.70	$1.65	$1.60	$1.55	$1.50
14000	$2.15385	$2.10	$2.04615	$1.99230	$1.88460	$1.83080	$1.77690	$1.7230	$1.66940	$1.61540
13900	2.13846	2.0850	2.03153	1.97807	1.87114	1.81772	1.76421	1.7107	1.65748	1.60386
13800	2.12308	2.07	2.01692	1.96384	1.85768	1.80464	1.75152	1.6984	1.64536	1.59232
13700	2.10769	2.0550	2.00230	1.94691	1.84422	1.79156	1.72883	1.6861	1.63344	1.58088
13600	2.09231	2.04	1.98769	1.93538	1.83076	1.77848	1.72614	1.6738	1.62152	1.56934
13500	2.07692	2.0250	1.97307	1.92115	1.81730	1.76540	1.71345	1.6615	1.60960	1.55780
13400	2.06154	2.01	1.95846	1.90692	1.80384	1.75232	1.70076	1.6492	1.59768	1.54626
13300	2.04615	1.9950	1.94385	1.89269	1.79038	1.73924	1.68807	1.6369	1.58576	1.53472
13200	2.03077	1.98	1.92993	1.87846	1.77692	1.72616	1.67538	1.6246	1.57384	1.52318
13100	2.01538	1.9650	1.91461	1.86423	1.76346	1.71308	1.66269	1.6123	1.56192	1.51154
*13000	2.00	1.95	1.90	1.85	1.75	1.70	1.65	1.60	1.55	1.50
12900	1.98461	1.9350	1.88539	1.83577	1.74654	1.68692	1.63751	1.5877	1.53808	1.48846
12800	1.96923	1.92	1.87007	1.82154	1.73308	1.67384	1.62462	1.5754	1.52616	1.47692
12700	1.95384	1.9050	1.85615	1.80731	1.71962	1.66076	1.61193	1.5631	1.51434	1.46538
12600	1.93846	1.89	1.84154	1.79308	1.70616	1.64768	1.60924	1.5508	1.50242	1.45384
12500	1.92307	1.8750	1.82693	1.77885	1.69270	1.63460	1.59655	1.5375	1.49050	1.44230
12400	1.90769	1.86	1.81831	1.76462	1.67924	1.62152	1.58386	1.5252	1.47858	1.43076
12300	1.89230	1.8450	1.80770	1.75039	1.66578	1.60844	1.57117	1.5129	1.46666	1.42922
12200	1.87692	1.83	1.78308	1.73616	1.65232	1.59536	1.55848	1.5006	1.45474	1.41768
12100	1.86153	1.8150	1.76847	1.72193	1.63886	1.57228	1.54579	1.4876	1.44282	1.40614
12000	1.84615	1.80	1.75385	1.70770	1.62540	1.55920	1.53310	1.4753	1.43090	1.39460

*Basing price.

PENNSYLVANIA COKE OVENS.

George B. Irvin, secretary of the Coke Producers' Association, has compiled a table of the number of coke ovens in the state of Pennsylvania, showing those in each county outside of the Connellsville region and those within the Connellsville region. The table is as follows:

Allegheny county	2,328
Armstrong county	50
Blair county	140
Bedford county	336
Beaver county	240
Clearfield county	746
Cameron county	60
Cambria county	2,009
Elk county	100
Huntingdon county	44
Indiana county	502
Jefferson county	2,241
Mercer county	210
Somerset county	225
Washington county	438
Westmoreland county	4,670
Total	14,384
Connellsville region	36,399
By-product ovens	1,000
Total in Pennsylvania	51,783

Recent additions to old plants and the construction of new ones bring the total number of ovens to date to above 52,000.

Changed Its Name.—Announcement is made by the Cleveland Crane & Car Co., Wickliffe, O., that having discontinued the manufacture of cars for a number of years past and realizing the importance of a more descriptive firm name, it will hereafter be known as the Cleveland Crane & Engineering Co. Under such title the company's production will be confined to the exclusive manufacture of cranes of every description including traveling, gantrys, mono-rail and grab-bucket handling equipment of various types.

TEXAS METAL TRADES ASSOCIATION.

The annual convention of the Texas Metal Trades Association was held in San Antonio, Oct. 8 and 9, with good attendance with W. S. Mosher, president, of Dallas, in the chair and W. C. Trout, secretary, of Lufkin, at his desk.

It was resolved to incorporate under the laws of Texas, its membership to include founders, machinists, boiler and tank builders, and structural and bridge builders. Three new members were added to the organization besides the election of Hardy Greenwood, of San Antonio, to honorary membership.

Discussions on the following subjects were led by the gentlemen named who read papers thereon:

D. R. Jamerson, of the Union Iron Works, Houston, on "Shop Cost System;" W. C. Trout, of the Lufkin Foundry & Machine Co., Lufkin, Texas, on "Buyers' Contracts" especially that applying on pig iron and as adopted by the Iron Buyers' Association pig iron contract; E. Y. Hartwell, of the Hartwell Iron Works, Houston, on "Molding Machines;" Hardy Greenwood, of San Antonio, sales agent for Pioneer pig iron and Milwaukee Solvay foundry coke, led the discussion on freight matters.

The members all appeared satisfied that the organization had done effective work in its several directions during the past year.

Election of officers for the ensuing year resulted as follows: W. C. Trout, of Lufkin, president; J. H. Holmgreen, of the Alamo Iron Works, San Antonio, vice president; D. R. Jamerson, of the Union Iron Works, Houston, secretary.

Committees were appointed and it was decided to meet in Beaumont, Texas, next year.

A TEST FOR ASCERTAINING THE RELATIVE WEARING PROPERTIES OF RAIL STEEL[1]

By E. H. Saniter

As far as the author is aware, there have been only two testing methods tried for ascertaining the wear of rail steel, viz., the grindstone, which has been generally condemned as being of doubtful value, and that of Dr. Stanton, which is more a fatigue test, and does not take account of the amount of the abrasion of the steel. During the last three years the author has devised a testing machine for this purpose which would imitate the conditions of actual practice and, at the same time, complete a test in an hour or two.

The principle on which the test rests is as follows: A round test piece revolving a fixed number of revolutions and rotating by friction the inner ring of a ball bearing loaded with a fixed weight, the action being very similar to the action of a wheel rolling on a rail. The test piece is made sufficiently long to project well through the ball bearing and thus prevent any material side flow of the metal.

Fig. 1 is a drawing of the machine and the following description of it, will make the above clear. A is the driving motor. B a brake which is kept out of action by the electric plug contact M. When M is withdrawn it breaks the circuit and allows the brake to stop the machine. J is the spindle which runs in an oil bath and is actuated by a worm gear and runs at 4,000 revolutions per minute. To it is attached the chuck K, which holds the test piece F.

The chuck is one piece of steel with a central hole slightly larger than the test piece. There are three pairs of set screws with lock nuts for holding the test piece and also for centering it. This is done by gradually lowering the ball bearing and adjusting the test piece until continuous contact is obtained.

The lever C holds N, the carrier of the ball bearing, on a pin O, the carrier being made so that it can move on the pin in any direction, and adjust the ball bearing to the test piece independently of the lever. E is the ball bearing; the outer ring is gripped by the carrier N, and the inner ring is rotated by the revolving test piece F. The arm L holds a screw with lock nut, which is set against the bearing carrier to prevent the slight forward thrust of the spindle J from pushing the bearing outwards. D is a hook with a thumb-screw by which the lever and bearing can be raised while starting the machine, and then gradually lowered onto the test piece, thus avoiding straining the test piece by starting with the load on. On the end of the lever C is a hanger for holding the weights G. H is the revolution counter.

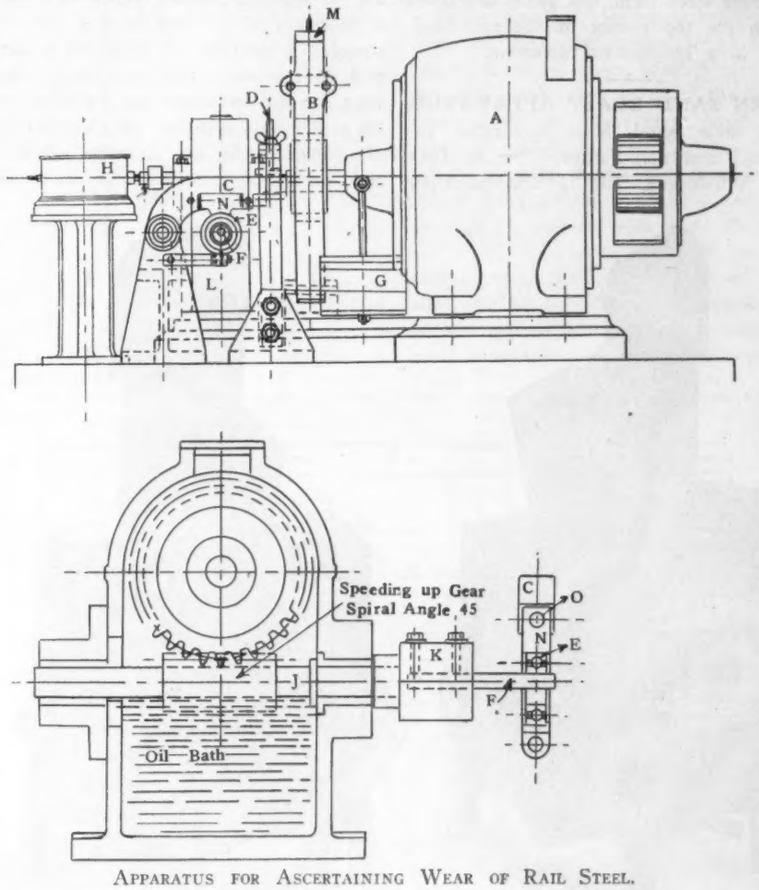
The ball bearings used are ordinary 1-inch bearings, and are made of quenched case-hardened steel, but in spite of this it is found that the inner ring of the bearing in contact with the test piece gradually wears, and a new bearing has to be substituted. It is desirable, therefore, to insure comparable tests, that a standard steel should be used for testing new bearings or partially worn old ones.

In view of the possible irregularity of the quenched steel bearings, it is a question for consideration whether a self-hardening nickel or tungsten steel should be used for the inner ring in order to insure regularity of hardness right through the piece.

The particulars of the test are as follows: Test piece 5 inches by ½-inch round. Number of revolutions 200,000, with a load of 205 pounds on the bearing at the point of contact with the test piece. Length of test piece in contact with bearing 11/16-inch. Test occupies 50 minutes.

The test piece at the part used is carefully measured with a micrometer gage to 0.0001 inch, before and after the test, and the wear test number as given in the table below is the number of ten thousandth parts of an inch by which the diameter has been reduced. In order to be sure of accuracy in case of any irregularity in diameter of the test piece either before or after the test the portion of the test piece used is measured in three places, and also in a plane at right angles, making six measurements in all, the average being taken as the correct diameter. The appearance of the worn surface is similar to that of a rail under traffic.

When the test is in progress the high speed of the machine draws a current



Apparatus for Ascertaining Wear of Rail Steel.

[1]A paper presented at the Middlesbrough (Sept., 1908) meeting of the British Iron and Steel Institute.

of air through the bearing which removes the abraded particles, and these may be ignited by a match and form a small shower of sparks.

The following tests illustrate the comparative results obtained on steels of varying hardness:

	C.	Si.	S.	P.	Mn.	Ni.	Wear No.
Rail	0.63	0.247	0.029	0.029	0.72	3.52	28
Rail	0.77	0.064	0.022	0.012	0.78	Nil	45
Rail	0.71	0.073	0.019	0.010	0.72	"	48
Tram rail	0.59	0.278	0.026	0.031	0.82	"	48
Tram rail	0.51	0.313	0.056	0.057	0.68	"	64
Rail	0.43	0.215	0.050	0.055	1.04	"	65
Rail	0.40	0.091	0.056	0.058	1.08	"	67
Axle	0.30	0.114	0.028	0.027	0.69	"	75

The smallest wear number is the least wear, and consequently the best wearing steel. The test pieces are taken from the top corner of the rail head, and in a longitudinal direction.

JORN SAND BLAST APPARATUS.

A new sand blast apparatus invented and manufactured by A. Jorn Jr., Waukegan, Ill., is illustrated by the accompanying views and drawing. Figs. 1 and 2 are front and rear elevations and Fig. 3 shows the interior arrangement of the apparatus. The apparatus is unique in its manner of feeding the sand into the air blast and of recovering the sand for continuous use until it is reduced to dust and is carried out through an exhaust pipe. In addition unusual advantages are claimed in the matter of simplicity, cheapness, efficiency and effective area and the standard 18-inch sand blasting apparatus is calculated to sandblast an area of 150 to 180 square feet per hour.

The apparatus shown in Fig. 3 and the elevator for raising and returning the sand to the blast after each successive using is entirely enclosed in a frame structure. The sand for the blast is discharged from the elevator through a spout into a supply hopper where it accumulates around the twin outlet Y-end of the blast pipe. The hopper is fitted over a nozzle bottom, a cross section of which is shown in Fig. 4. This nozzle is separated from the hopper by a partition which has in it a central opening admitting the sand to a central compartment and also two openings for the admission of the air pipes on either side into the air chamber of the nozzle, the air chamber jacketing the sand compartment on both sides. Both compartments have a lateral convergence toward the discharge opening of the nozzle. The admission of the sand into the air blast is controlled by a cylinder mounted on a shaft so placed in the mouth of the sand chamber that the cylinder controls the aperture. The cylinder is made with longitudinal grooves, the entire circumference being so provided. The sand descends from the hopper above upon this cylinder, directed and retained by proper deflectors and lips, and fills in the grooves on the exposed surface of the cylinder. The cylinder then revolving acts as a valve and the grooves act as valve ports with the result that a regular and uniform discharge of the sand into the air blast is accomplished. The rapidity of the discharge can be controlled by the speed of the rotating cylinder. The discharge nozzle may be adjusted for varying areas to be sandblasted by swinging out one side of the nozzle on its hinges.

The support for the work to be sandblasted consists of a set of parallel endless belts hung on rollers as shown in the illustration. The sand falls between these belts into a helical screw conveyor which transfers the sand to the boot of the elevator mentioned above, whence it is returned for further use.

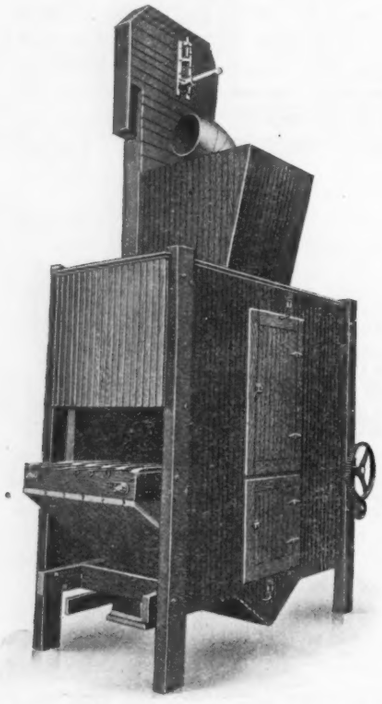


FIG. 1—FRONT OF JORN SAND BLAST APPARATUS.

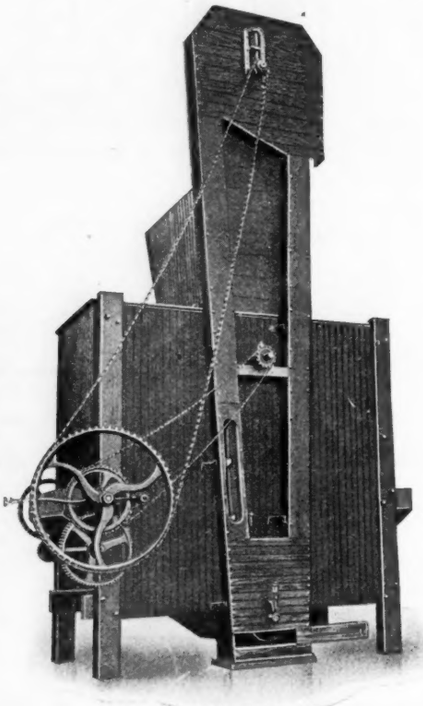


FIG. 2—BACK OF JORN SAND BLAST APPARATUS.

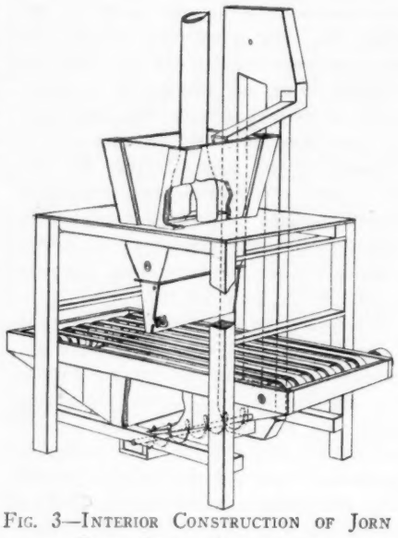


FIG. 3—INTERIOR CONSTRUCTION OF JORN SAND BLAST APPARATUS.

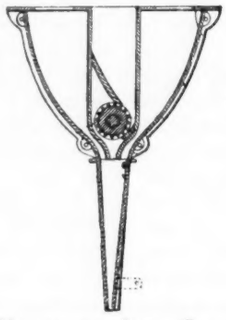


FIG. 4—NOZZLE OF JORN SAND BLAST APPARATUS.

The National Refined Iron Co., of Pittsburg, is surveying for a new mill at Rochester, Pa. The plant will be of moderate size.

MODERN OFFICE PRACTICE—V

Filing Quotations

By Ridgley Newcomb

How best to keep a record of all the quotations on material received from the hundreds of jobbers and manufacturers, so that all quotations on a given article may be instantly available, is one of the questions purchasing agents are interested in, and one which few of them have solved to their entire satisfaction.

In an office where millions of dollars are spent annually, there are, of course, many things which are covered by contract. There are also, many things which are placed with the lowest bidders. On some of them it is necessary to send out inquiries from time to time; yet there are a great many articles on which the dealers, or manufacturers, make periodical quotations, prices which stand until new ones are made.

How then is the best way to keep a record of these prices and of the contractors with whom a contract may be in effect to furnish all of a given material that the firm may need within a stated period at a given price? The object of this article is to describe a system which will take care of all these points and enable the purchasing agent to find within a few seconds just the information he wants.

While the system which follows, is intended primarily for use in a large office, obvious changes could be made which would make it equally valuable to a smaller concern, or to retailers in any line of trade. The equipment necessary, is a two-drawer card cabinet, taking 4 x 6-inch cards. This size will be found, for the most part, convenient and large enough. If a larger card is considered preferable, a 5 x 8 card may be used instead. In the majority of cases, however, it will be found that the former is sufficient, and is less cumbersome.

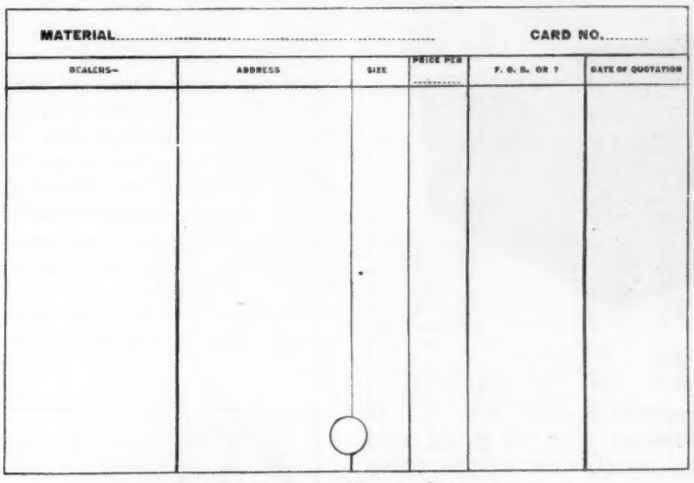


Fig. 1—Card for Filing Quotations.

The cards should be ruled and printed as shown in Fig. 1. As will be seen, the card provides for the name of the article at the top, on which the prices are quoted; the names of the firms making the quotations; their addresses; the prices named; how sold (whether f. o. b. shipping point or destination), and the date of the quotation. Each card will hold the names of 13 firms. Should there be others, another card can be used, numbering it 2 in the space provided at the upper right hand corner.

It is well as a new quotation is received from a firm, to draw a red line through the old one and write the new one on the next unused line of the last card covering that series. That will enable one at all times to compare the present quotation with previous ones. If after a year or two, none of the prices

MATERIAL Hose Steam 1" di. CARD NO. 1
DEALERS
ADDRESS
SIZE
PRICE PER
F. O. B. OR ?
DATE OF QUOTATION
MATERIAL Hose Air - 60 lbs. pressure 3/4" di. CARD NO. 1
MATERIAL Hose 2 1/2" Fire CARD NO. 1
MATERIAL Hose 3" Fire CARD NO. 1
J.C. Smith & Co. 19 Read St. N.Y. 3" 4 ply $1.01 f.o.b. Shipping Pt. 5/10/08
Elmer T. Jones 314 Hyde Pl. Phila. 3" 4 ply $1.005 " " 5/23/08
Douglass Carroll 2614 Park Ave Balt " 1.025 f.o.b. destination 6/1/08
Leonard West Co. 417 Jones St. Chi " 1.00 " Chicago 6/13/08
Wilmer Jones & Co. 917 East Ave Newark " .99 Newark N.J. 6/20/08
Lewis Wilson Bros. Cor. Laight & West Sts. N.Y. " 1.00 " Troy N.Y. 6/30/08
J.C. Smith & Co. 19 Read St. N.Y. " 1.00 " New York 7/10/08

Fig. 2—Method of Filing Quotations on Different Sizes of Same Material.

named by the firm on the first card is in effect, the card may be thrown away if the drawer is becoming filled. For the most part, it will be well to keep the cards in the file until they are several years old. The clerical work involved is very little. As a rule, it will not average more than a price a day to be changed, and the stenographer or clerk can keep it live without any trouble.

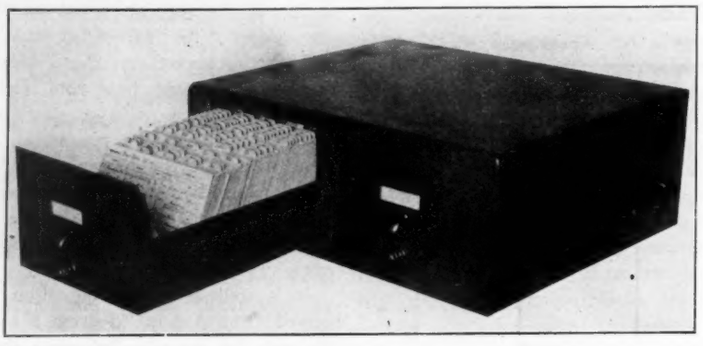


FIG. 3.—QUOTATION FILE.

So much for the card itself. The key to the situation is filing the cards in the drawers so that the person desiring the information, will know without hesitation where to put his hand on the card wanted. These cards will be filed in the left hand drawer of the case, alphabetically, according to the material quoted on, and will be separated by alphabetical guide tab cards, blue in color, and cut to fifths. If a set with 150 sub-divisions of the alphabet is obtained, it will be found advantageous and if these are celluloid, they will finger easier and will last much longer. Naturally hose, hammers, wrenches, rope, pipe, etc., would all be under their respective initial letters.

How will we meet the question of these items which come in different sizes? Pipe, hose, rope and other things are of different sizes. The solution is easy and simple. The cards are filed under the name of the item quoted on. To be specific, suppose we take hose as an example. A card is written for each size that is quoted on, and the group of the several sizes be filed one back of the other, largest sizes in front, under "H." Cards reproduced in Fig. 2 show this arrangement.

There will naturally be some items to which reference will be made oftener than to others. To facilitate ready reference to them, blank tab cards of a different color may be placed immediately in front of these particular cards, and the tab lettered plainly "Hose" or whatever subject it may be desired to sub-index.

The right hand drawer of the cabinet may be reserved for use when the first drawer gets too full for comfort. In one case, however, it has been deemed expedient to carry an alphabetical list of names of all the dealers who are grouped in the other drawer under the names of the items with which they are identified. For this second scheme, a plain stock card will be used, a single firm name to a card, while on the line below the name will appear the address and then beneath that may be added the line of goods which they carry.

In very large offices, it may be necessary to use a four-drawer cabinet. The writer, however, considers that one system of indexing is all that is necessary, though if it is desirous of knowing quickly the address of any of the firms with whom business is done, the alphabetical arrangement in the second drawer will be useful.

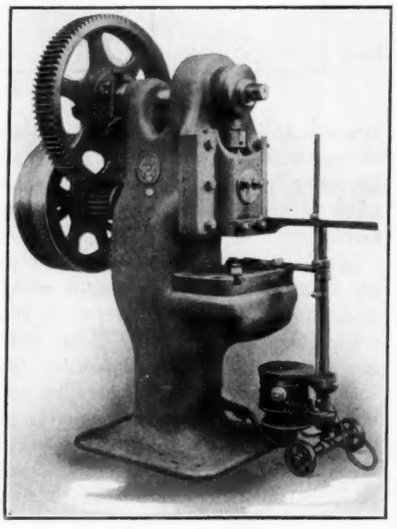
AN ELECTRIC "BOY."

The Ferracute Machine Co., Bridgeton, N. J., makes a specialty of presses for stamping sheet metals and before shipping its machines carefully tests them by running them in the shop for a day or so during which time any defects in their action become apparent. Machines of this class are usually provided with a clutch connecting the flywheel or gear wheel to the shaft, the connection being made when the clutch is tripped by the operator placing his foot on the treadle. The company formerly employed boys to do this tripping but has recently constructed an electric "boy," shown in the accompanying illustration, "who," it is claimed does the work much more satisfactorily than the real article.

The contrivance is extremely simple, consisting of a weight or plunger which is raised by a solenoid and dropped by gravity when the current is broken. The core of the solenoid projects through the top of the casing, affording an opportunity to suspend it by means of a latch when not in use. The foot of the "boy" is connected to the solenoid by a ball joint thereby eliminating the friction when pressure is applied to the treadle.

An arm attached to the ram of the press raises the trip-rod as the ram nears the top of its stroke, thereby breaking the current and releasing the weighted core or plunger which then drops upon the treadle, the trip-rod descending with the ram until contact is again made when the weight rises, the continued making and breaking of the circuit giving the desired intermittent vertical motion which is an almost exact counterpart of the action of a human foot on a treadle.

The device is adjustable to adapt it to the wide variety of sizes of presses built by the company, there being a split sleeve at the base, allowing the foot to be adjusted up or down and the trip rod being long enough to reach the rams of all ordinary sizes of presses. The device is mounted on casters and moved around to the machine it is to operate.



THE ELECTRIC "BOY."

Building of a 200-foot trestle and a mile of new track into Riverside, a suburb of Sheboygan, Wis., has been started by the Sheboygan Light, Power & Railway Co., and it is expected that within six weeks interurban cars will be running over the right of way purchased by the company.

Stock Market Marks Time.

Activity in the New York stock market last week was limited, prices rallying sharply early in the week on the outlook for the more peaceful settlement of the Balkan difficulties, but trading afterward became slow, and political uncertainty had a restrictive influence. Among the features of the week was the advance in Westinghouse Electric to 81½, the highest price of the year. This followed the announcement by a number of New York banks that they had agreed to the settlement of their claims against the electric company.

Monday the market ruled strong and higher, London buying 25,000 American shares on balance. Wheat advanced to a new high price on the crop, and then lost the gain. Shares were inactive Tuesday, and prices irregular. London sold but 15,000 shares on balance. American Can preferred advanced to 69⅞, the highest price for more than a year. Wednesday came the Westinghouse Electric announcement, and numerous low-priced stocks advanced, but standard issues were dull, tending downward. Thursday was marked by inactivity and insignificant price changes. London again became a moderate buyer of American shares, and the foreign political situation was regarded as reassuring. Friday's opening was strong, but was followed by a reaction, and the close found most of the gains lost. Saturday's market was extremely dull, and prices closed slightly lower on depressing advices concerning the Balkan difficulties.

A feature of the week in New York finances was the increase in loans of New York banks, a little more than $14,000,000 for the week, making a total expansion of more than $26,000,000 in two weeks. During the week, $14,000,000 in Southern Pacific bonds were sold; $4,000,000 in New York City warrants; $2,000,000 in Chicago & Alton equipment notes, and several like transactions of minor importance. At the same time during the week, about 300,000 shares of American securities held by foreigners on the war scare of two weeks ago were reported on their way to New York. All these transactions were responsible for the advance in call loan rates to 2½ per cent during the past week. The money market in general, however, remains easy, the maximum of 2½ per cent on call loans the past week comparing with 6 and 8 per cent paid in the corresponding week last year.

The actual condition of clearing house banks for the week showed loans increased $14,383,800, and the percentage of actual reserve 27.39, a decrease of 0.01 per cent. Non-member banks and trust companies of greater New York showed loans increased $6,835,900, total deposits increased $4,408,000, and the percentage of reserve was 33.3, a decrease of 0.4 per cent. Bank clearings for the week showed a decrease of 4 per cent over the preceding week, and of 13 per cent over the corresponding week last year. Outside of New York, the total showed a loss of 3 per cent over the preceding week, and of 15 per cent over the corresponding week last year. Commercial failures for the week aggregated 269, against 256 the preceding week, and 228 the corresponding week last year. Shares were dealt in to the number of 2,671,687, compared with 4,212,562 the preceding week, and 4,813,890 the corresponding week last year. Bonds, exclusive of government bonds, were sold to the amount of $20,691,000, compared with $18,060,000 the preceding week, and $10,291,000 the corresponding week last year.

Copper Stocks.

New York.—Amalgamated Copper closed 75½, a net gain of 1⅛.

Boston.—Butte Coalition closed 24¾, a net gain of ½; Calumet & Arizona closed 118, a net gain of 2½; Calumet & Hecla closed 660, no change; North Butte Mining closed 82½, a net gain of 1⅛; Quincy Mining closed 91, a net loss of 1.

Financial Notes.

The Pennsylvania Steel Co. declared a semi-annual dividend of 3½ per cent on preferred stock, payable Nov. 2.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quo. Oct. 17	Changes in Week	Date 1908 Ann. M't'g	Stock Outstanding	Dividend Basis	Dividend Last Declared	Dividend Date Last Div. Pay.
Allis-Chalmers	11¾	+ ⅝	Sept. 3	19,820,000			
Allis-Chalmers pr	35⅞	+ ⅞		16,150,000	7 cum	1¾ Q.	Feb., 1904
American Can	6¾	+ ⅛	Feb. 3	41,233,300			
Am. Can pr	66½	+1⅜		41,233,300	7 cum	1¾ Q.	Oct., 1908
Am. Car & Foundry	40¾	+ ¼	June 25	30,000,000		½ Q.	Oct., 1908
Am. Car & Fdy. pr	102½	-- ⅝		30,000,000	7 n. c.	1¾ Q.	Oct., 1908
American Loc.	49	+ ¼	Oct. 20	25,000,000	5	1¼ Q.	Aug., 1908
American Loc. pr	105	.....		25,000,000	7 cum	1¾ Q.	Oct., 1908
American Ship	51¼	+2⅜	Oct. 14	7,600,000	4	1 Q.	June, 1908
American Ship pr	100	— ⅜		7,900,000	7 n. c.	1¾ Q.	Oct., 1908
Am. Steel Foundries. pr.	42⅝	+ ⅜	Oct. 6	15,810,000			
Am. Steel Foundries(new	30	.....		14,247,400	6 cum	2¼	Aug., 1904
Barney & Smith	40	.....	June 2	2,000,000	4	1 Q.	Sept., 1907
Barney & Smith pr	110	.....		2,500,000	8 cum	2 Q.	June, 1908
Bethlehem Steel	20	—2½	April 7	14,862,000			
Bethlehem Steel pr	45½	—1		14,908,000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	36	.....	March 17	45,000,000*	6	1½ S. A.	Aug., 1908
Cambria Iron	45½	.....		8,468,000*	4	2 S. A.	Sept., 1908
Chicago Pneumatic Tool	24½	— ⅜	Feb. 17	6,145,800	4	1 Q.	Oct., 1907
Colorado Fuel	35¼	+ ¼	Oct. 19	34,235,500		3½	April, 1902
Crucible Steel	6	.....	Oct. 21	24,578,400			
Crucible Steel pr	43½	+2		24,436,500	7 cum	1 Q.	Dec., 1907
Empire Steel	6	.....	Feb. 26	1,254,770			
Empire Steel pr	47	.....		2,500,000	6 cum	3 S. A.	July, 1908
Fay & Egan	100	.....	Feb. 18	1,000,000	6	1½ Q.	Aug., 1908
Fay & Egan pr	110	.....		1,000,000	7 cum	1¾ Q.	Aug., 1908
General Electric	144	+3	May 12	65,167,000	8	2 Q.	Oct., 1908
Harbison-Walker	13	.....	Jan. 20	18,000,000		½	Oct., 1907
Harbison-Walker pr	75	.....		9,6 0,000	6 cum	1½ Q.	July, 1908
International Pump	29	+1⅛	June 2	17,787,300	1		April, 1903
International Pump pr	82	+ ¼		13,835,000	6 cum	1½ Q.	Aug., 1908
Lackawanna Steel	34	.....	March 11	34,971,400			
Lake Sup. Corp	8¼	+1¾	Oct. 7	40,000,000			
New York Air Brake	77⅜	+7¼	June 18	8,012,500	8	2 Q.	Oct., 1907
Niles-Bement-Pond	130	.....	Feb. 5	8,500,000	6	1½ Q.	Sept., 1908
Niles-Bement-Pond pr	100	.....		2,000,000	6 cum	1½ Q.	Aug., 1908
Otis Elevator Co.	37	.....	March 16	6,156,600		1½ S. A.	April, 1908
Otis Elevator Co. pr	91	+1		5,449,500	6 n. c.	1½ Q.	Oct., 1908
Penn. Steel	50	.....	May 11	10,750,000			
Penn. Steel pr.	103	+1		16,500,000	7 n. c.	3½ S. A.	May, 1908
Pittsburg Coal Co.	11¼	+ ⅛	Feb. 10	28,853,400			Nov., 1900
Pittsburg Coal Co. pr	39	.....		27,080,800	7 c.	1¾	April, 1905
Pressed Steel Car	32⅝	— ⅜	Feb. 19	12,500,000	3		Aug., 1904
Pressed Steel Car pr	92	.....		12,500,000	7 n. c.	1¾ Q.	Aug., 1908
Pullman	163¾	+ ½	Nov. 11	100,000,000	8	2 Q.	Aug., 1908
Railway Stl. Spring	38	.....	March 5	13,500,000	4	2 S. A.	April, 1908
Railway Stl Spring pr	98	.....		13,500,000	7 cum	1¾ Q.	Sept., 1908
Rep. Iron & Steel	22¼	+1¼	Oct. 21	27,191,000			
Rep. Iron & Steel pr	79⅜	— ⅛		20,416,900	7 cum	1¾ Q.	April, 1908
Sloss-Sheffield	62⅞	+ ⅜	March 11	10,000,000	5	1 Q.	Sept., 1908
Sloss-Sheffield pr	102¼	.....		6,700,000	7 n. c.	1¾ Q.	Sept., 1907
U. S. Pipe & Fdy.	24⅛	+ ⅛	June 24	12,500,000	4	1 Q.	Dec., 1907
U. S. Pipe & Fdy pr	71⅝	.....		12,500,000	7 n. c	1¾ Q.	Sept., 1908
U. S. Steel	46¾	+ ¾	April 20	508,302,500	2 n. c.	½ Q.	Sept., 1908
U. S. Steel pr	108⅝	— ⅛		360,281,100	7 cum	1¾ Q.	Aug., 1908
U. S. Steel 5'	102¼	+ ⅛		463,798,000	5	5 A.	.....
Va. Iron, Coal & Coke	56½	.....	Nov. 17	9,073,680			
Westinghouse Elec.	81½	+7⅛	June 24	23,933,200	10	2½ Q.	Oct., 1907
Westinghouse Air Brake	105	—1	Oct. 6	14,000,000*		2½ Q.	Oct., 1908

Par value of shares, $100, except those starred (*), $50

NEWS FROM MANY INDUSTRIES

New Buyers:—

C. H. Pomeroy and Clarence H. Jones, both of Seattle, Wash., have incorporated the Seattle Machinery & Supply Co., capitalized at $25,000.

Articles of incorporation have been secured by the Automatic Brake Co., Haverhill, Mass., to manufacture brakes, with $30,000 capital stock.

The Bethlehem Steel Products Co., Bethlehem, Pa., with $5,000 capital stock, has been incorporated by Archibald Johnson, Barry H. Jones and Eugene Grace, Bethlehem, Pa.

The Conners-Weyman Steel Co., Helena, Ala., to manufacture cotton ties, has been incorporated with $50,000 capital stock, by S. F. Weyman, C. W. Conners, W. M. Hoke and J. H. Maxwell.

A charter has been granted to the Sharon Hardware Mfg. Co., Sharon, Pa., capitalized at $75,000. The incorporators are: John B. Howat, William L. Walter and J. P. Whitla, Sharon, Pa.

The Metalware Mfg. Co., Dayton, O., has been granted a charter upon the application of J. R. Jones, H. B. Myers, Ralph E. DeWeese, J. B. Moyers and Lee Markley. The capital stock is $10,000.

The National Sheet Steel Co., Mansfield, O., has filed articles of incorporation, with an authorized capital of $100,000. The incorporators are: Austin Lynch, D. B. Day, C. M. Stelling, U. A. Wernel and H. L. Raley.

The Standard Machine Co. has been organized at Quincy, Ill., for the purpose of doing a general manufacturing business, and has been incorporated by: T. C. Gager, H. H. Zenge, William Zenge and J. Andrew Zenge.

W. H. Dickman, C. A. Walker and J. T. Marron have filed articles of incorporation as the Trio Mfg. Co., Rock Island, Ill., to engage in the manufacture of electrical machinery. The company is capitalized at $40,000.

The Corrugated Pipe Co., Ltd., has been organized by William Dawson, W. H. Burgess, Thomas J. Moore and others, with an authorized capital of $25,000. The company will have its principal office at Stratford, Ont.

The National Wrapping Machine Co., of Los Angeles, Cal., which has been chartered under the laws of West Virginia with a capital stock of $100,000, will locate its chief works at Racine, Wis. The incorporators of the new company are: J. C. Meacham, Racine, Wis.; F. H. Merrill, Pasadena, Cal.; J. M. Patterson, Ernest Breese and E. Burr of Los Angeles. The bulk of the stock has been disposed of.

The International Nut Co., Niagara Falls, N. Y., to manufacture nuts, bolts and screws, has been incorporated with $225,000 capital stock by Roscoe A. Ellis, Edward D. Cleghorn and Warren Chambers, all of Niagara Falls.

Articles of incorporation have been filed by the Acme Stamping & Tool Works, Ltd., of Hamilton, Ont., with $40,000 capital. The provisional directors of the company are Elijah E. Bowman, Thomas H. Barnard and D'Albert Quick.

Thomas Rowland, William H. McGuire, Charles S. Peaslee and others have secured incorporation as the American Electric Furnace Co., Ltd., to manufacture electric furnaces, etc., at Niagara Falls, Ont., with a capital of $50,000.

The Duplex Spring Protection Co., Boston, with $15,000 capital stock, has been incorporated to manufacture and sell springs for carriages. Arthur D. Howlett, 40 State street, Boston, is president, and Charles E. Daniels, also of Boston, is treasurer and clerk.

The Grenetso Engineering Co., New York City, has been chartered to manufacture engines and machinery, with $5,000 capital stock. George F. Parmalee and Stuart M. Beard, Bronxville, N. Y., and Oscar P. Ostergren, 533 Tenth street, Brooklyn, N. Y., are the incorporators.

Thomas F. Garrity, 286 President street, Brooklyn, N. Y.; Warren H. Loss, Rutherford, N. J., and Robert B. Miller, 146 W. Sixteenth street, New York City, have incorporated as the Accurate Co., New York City, to manufacture adding machines. The capital stock has been placed at $20,000.

The Warren City Tank & Boiler Co., Warren, O., which has been conducted heretofore as a copartnership, has been incorporated with $150,000 capital stock by A. R. Hughes, B. W. and John Edwards, Bert Seilple and Daniel O'Rourke.

Articles of incorporation have been granted to the Safety Power Transmission Co., Brooklyn, N. Y., to manufacture machinery, tools and mechanical devices, with an authorized capital of $50,000. The incorporators are Henry F. M. Peydeyn, 300 Sherman street, Brooklyn; Nelson L. Jacobus, East Orange, N. J., and Frederick J. Schussel, Oyster Bay.

The Quayle-Larson Co., Duluth, with $500,000 capital stock has been granted a charter to manufacture machinery and other various merchandise. The officers of the new corporation are: W. F. Quayle, president; John Wanless, vice president, and John L. Larson, secretary.

Articles of incorporation, to manufacture and deal in metal wheels, metal rims and parts, have been granted to the Standard Universal Rim Co., Jersey City. The capital stock is placed at $50,000, and the incorporators are S. B. Manz, John R. Turner and Sydney A. Anderson, all of Jersey City.

A charter has been granted to the Atkin Iron Works, Brooklyn, N. Y., to manufacture structural and ornamental iron work, with $10,000 capital. Those interested are David Davis, 6 Sheffield avenue, Brooklyn; Louis Livingston, 161 West 140th street, and Israel Block, 259 West 112th street, both of New York City.,

The Acme Harvesting Machinery Co., Grafton, W. Va., has been incorporated with a capital of $3,500,000. The incorporators are Harry Goodman, Arthur L. Swartz, John F. Rosen, George H. Foster and Fred W. Reinhardt, all of Chicago, Ill. The company will have offices at Chicago and chief works at Peoria, Ill.

The Lumley Purchasing & Supply Co., New York City, to deal in railroad equipment, with an authorized capital of $10,000, has secured articles of incorporation. Those interested are: Thomas J. McPherson, 1174 Jackson avenue; Charles Cole, 123 West Eighty-third street, both of New York City, and Arthur M. Brothers, Mineola, N. Y.

The Wilson Nail Co., Chicago, has been incorporated with $2,500 capital stock. A. W. Wilson, W. T. Jones and W. J. Cox are the incorporators.

The Nameuken Iron Co., Duluth, Minn., has filed application for a charter, with $2,000 capital stock. The incorporators are: Charles Eden, David Taylor, William A. McClaren, and Louis Jackson.

The U. S. Magneto Co., Ashland block, Chicago, has been chartered for the purpose of manufacturing electric motors and appliances, with a capital of $150,000. Those interested include Charles J. Dannenbaum, W. D. Pennington and George T. Olsen.

Queens Motor Works, Rockaway

Beach, N. Y., ship building, has been incorporated with $3,000 capital stock by John P. Levine, 1422 Madison avenue; Edward Herring, 1514 Madison avenue, both of New York City, and Francis W. Heitman, 127 Summit avenue, the Bronx.

A charter has been granted to the Phoenix Iron & Steel Co., Birmingham, Ala., with a capital stock of $10,000. The following are officers for the first year: Leonard Joseph, president and general manager, and Eli Joseph, vice president.

The Jones Speedometer Co., New Rochelle, N. Y., has been chartered to manufacture instruments, tools, machinery, devices, etc., with a capital of $100,000. The incorporators are: Joseph W. Jones, George L. Holmes and Thomas S. Barrett, 2160 Broadway, New York City.

I. Block & Son, New York City, have been incorporated to manufacture stoves, ovens and cooking apparatus, with a capital of $50,000. The incorporators are: Rose A. Block, Abraham B. Block, 137 W. 188th street, and Bernard B. Block, 104 Delancy street, all of New York City.

The Cook Fire Door Co., Boston, has filed application for a charter to manufacture metal fire protecting doors, with $10,000 capital. Walter A. Cook, 14 L street, South Boston, is president and treasurer of the company, and William D. Dyer, Waverly, Mass., is clerk.

The Boston Concrete Machine Co., Boston, Mass., capitalized at $150,000, has been incorporated to manufacture concrete making machines. The officers of the company are: President. Frank E. Huxley, 36 Green street, Jamaica Plain; treasurer, William E. Reese, Revere; clerk, Charles F. A. Smith, Brookline, Mass.

The Nash-Christian Foundry Supply Co., Birmingham, Ala., has been incorporated with $30,000 capital stock, to succeed the Nash Foundry Supply Co., manufacturer of sea coal, heavy machine plumbago and all kinds of foundry facings. The plant will have a daily capacity of 30 tons. D. W. Nash is president of the company, and L. A. Christian, secretary-treasurer.

New Construction:—

J. Johnston and his superintendent, representing the Amherst Malleable Iron Co., a Pennsylvania concern, conferred with members of the Everett, Wash., chamber of commerce, Oct. 1, with a view of securing a site for the location of a malleable foundry in Everett. The proposed plant is to employ 100 men and to cost about $50,000 exclusive of real estate.

F. H. Davis has taken out a building permit for a machine shop, Park street and Fifteenth avenue, Milwaukee, to cost $8,000.

Camp Bros. & Co., Metamora, Ill., have purchased three lots west of their factory upon which to erect a foundry and office building.

The Griffith Charcoal Iron Co., Washington, Pa., is building a new rolling mill at Bridgeville, Pa., in which to roll special brands of iron.

The Advance Stove Works, Evansville, Ind., has taken out a permit to erect at its foundry, Read and Indiana streets, an addition to its molding department to cost $1,200.

The New Orleans Railway & Light Co., New Orleans, La., has advertised for bids for the erection of a steel building adjacent to the company's repair shops, Toledano, Camp, Pleasant and Magazine streets.

Work is in progress on the erection of a new addition to the Hudson & Sharp foundry at Green Bay, Wis. The old structure is being torn down and the new addition will be built to the new portion of the plant.

The American Machine Tool Co., Cincinnati, is making exterior and interior improvements to its plant at Sixth street and Eggleston avenue. An entire new shell has been built about the plant, and new equipment is being installed.

The Belmont Iron Works has been awarded the contract to build a one-story steel frame shop, 60 x 160 feet, at the southeast corner of Melrose and Wakeling streets, Philadelphia, for the Foerderer estate. The cost of the plant will be $8,500.

The proposed factory and foundry of the Torrance Malleable Iron Co., Vorheesville, N. Y., is nearing completion. A side track has been built from the West Shore road, and two of the main buildings are already under roof. When completed, the company will employ about 250 men.

The Manitowoc Aluminum Foundry Co., Manitowoc, Wis., advises that it is erecting an addition to its plant, 100 x 200 feet, two stories, of fireproof construction, which will be used as a core room and machine shop. The company has also purchased a lot, 80 x 165 feet, south of its plant, and plans to erect another building upon this site early next year.

The Manistee Iron Works has nearly completed its new plant at Grand Rapids, Mich., the corner stone of which was laid in 1907. The building measures 264 x 120 feet. The frame-work is of steel, cement being used for the floors, and the sides of Mississippi wire glass, making an absolutely fireproof building. The plant is also fitted with offices, drafting rooms, etc. The machinery will all be fitted with individual electric drives, and two electric traveling cranes, of 10 and 15 tons capacity respectively, have already been installed. The company manufactures vacuum pans, steam pumps of all kinds, engines, boilers and other machinery, and at present employs a force of 161 men, which it expects to increase when the new plant is in operation.

The Termaat & Monahan Co., Oshkosh, Wis., advises that it has purchased property adjoining its old plant, and is erecting a brick and steel machine shop, 70 x 250 feet. The building will be two stories, and it is expected to be ready for occupancy Dec. 1. The company will double its capacity on marine engines, and add pumping and electric light engines to its output.

The contract for the construction of the new buildings of the Rock Island Tool Co., Rock Island, Ill., has been awarded to H. W. Horst of that city. The contract calls for an expenditure of $18,662. The plans for the building include one main office building, 30 x 40 feet, a machine shop, 80 x 160 feet, and a foundry, 80 x 120 feet. The buildings are to be modern in every respect.

Work on the new Pullman car shop, Pullman, Ill., has been started. The foundations have been laid, and it is hoped to have the building completed by the first of the year. It will be 450 x 300 feet, and will be used exclusively for the construction of steel passenger cars. The new plant, which will form part of the present Pullman car shops, will cost $400,000, and will employ about 1,000 men.

The Sayre Iron Works, Inc., Pheobus, Va., iron and brass founders, advises that all arrangements have been made for rebuilding the plant destroyed by fire July 8. The first construction will be a concrete foundry building 69 x 200 feet, which will be equipped with a five or six ton traveling crane with a 43 foot span, for which estimates are now being received. Later, it is planned to add a machine shop and office building. The works is now run in temporary quarters, and is taking the work that can be handled without crane service.

The Dwiggins Wire Fence Co., Anderson, Ind., advises that it is building a fireproof warehouse, for storing goods, of brick and steel, 80 x 160 feet. This

added to the length of its present building will make a structure 527 feet long. The company intends to run in an extra switch to its building, and will then be in shape to handle its line of goods in as economical a manner as possible, receiving the material at one end of the factory, manufacturing fencing and making shipments at the other end.

President O. C. Huffman, of the Virginia Can Co., Buchanan, Va., has purchased a site of three acres in Norwood, a suburb of Cincinnati, where a new can manufacturing plant will be located. The plant will be owned and operated by a new corporation yet to be formed, and will be separate and apart from the Virginia Can Co. It is proposed to expend $50,000 on the plant, inclusive of equipment, and it will be completed in about six months. The buildings will be of fireproof construction, brick and concrete, and it is proposed to have a capacity of 250,000 cans daily.

The Quinn Wire & Iron Works, Scranton, Ia., advises that having determined to move its plant to Boone, Ia., it has begun the erection of buildings at that place. The main building, of brick and concrete, wil be 132 x 144 feet, constructed in the form of a hollow square, the space in the center being used for a railroad switch, and the foundry will be 48 x 90 feet, with complete equipment. A machine shop, pattern room, storage and finishing room for hardware specialties will also be constructed. The plant will be heated throughout by steam. It is planned that the new plant will increase the company's output about twice.

General Industrial Notes:—

The Tufting Machine Supply Co., Chicago, has increased its capital stock from $2,500 to $25,000.

New machinery has been installed by the Lake Shore Engine Works, Marquette, Mich.

The new foundry of the McDonough Mfg. Co., at Eau Claire, Wis., has been opened, and the plant is in busy operation.

The Iowa Machine Works, Clinton, Ia., has taken over the plant and business of the Clinton Novelty Iron Works, on Eighth avenue.

The McGugin Iron & Coal Co., Olive Furnace, O., has amended its articles of incorporation, increasing its capital from $150,000 to $1,000,000.

It is announced that the Eberhardt Bros. Machine Co., 66 Union street, Newark, N. J., has changed its corporate name to the Newark Gear Cutting Machine Co.

G. W. Pritchett, who for some time has been connected with the Greensboro Suppply Co., has resigned to organize the Pritchett Machinery Co., which will operate in Greensboro, N. C.

The Trenton Brass & Machine Co., Trenton, N. J., whose plant was recently destroyed by fire, advises that at the present time it has not made any arrangements in regard to rebuilding.

The new turbine of the Beloit electric plant, Beloit, Wis., was installed and running 35 days after the order had been given. It is a 500-kilowatt turbine and increases the capacity of the plant 50 per cent.

The Ralston Steel Car Co., Columbus, O., is now operating the freight car department and is turning out a good sized order for the Delaware & Lackawanna railroad. The company also has orders for its steel underframes.

The New Orleans Foundry Co., which recently purchased the Schwartz Foundry Co., at New Orleans, has organized with $200,000 capital stock and has elected these officers: Louis Kohlmann, president; A. Katz, vice president; and Sigmund Kohlman, secretary and treasurer. The company expects to make improvements to the plant.

Trade Notes:—

The Engineering Service Co., New York City, electrical engineer and purchasing representative, announces that it has established offices in the West Street building, 90 West street, New York City, for the transaction of a general electrical engineering and contracting business, in the equipment of industrial, power and other plants.

Some recent sales of "Allen" riveters, reported by John F. Allen, 370-372 Gerard avenue, New York City, pioneer builder of pneumatic riveting machines, include one Allen riveter to the Paris Bridge Co., Paris, Ill., two riveters to the St. Louis plant of the American Car & Foundry Co., and two riveters to the Johnstown, Pa., plant of the Cambria Steel Co. One of the latter is a special riveter to exert 80 tons pressure on the rivet, with a reach of 60 inches and 22 inch gap.

Thos. R. Heyward & Co., Pittsburg, have issued a small pamphlet to foundrymen, calling attention to the advantages of the use of ground 80 per cent ferro-manganese. It is represented that the addition of this alloy to the mixture eliminates sulphur, prevents blow holes and excess shrinkage, strengthens a casting and makes it easy to machine. It is stated the common practice is to take ¼ to ½ per cent, depending upon the sulphur content of the pig iron and coke being used, place it in the bottom of the ladle, tap the molten metal on top of it and skim thoroughly before pouring into the molds. If the sulphur is high, increase the quantity of manganese proportionately.

Fires:—

The Mercer Furnace Co. and the Peoria foundry plant, Chicago, were damaged to the extent of $28,000, by a fire Oct. 14.

The buildings of the Colonial Coal & Coke Co., Dorchester, Va., were burned Oct. 5, entailing $30,000 damage.

The metal shop of Harry Butters, 84 First street, Cambridge, Mass., was damaged to the extent of $10,000 by fire recently.

The Southern Pacific roundhouse and master mechanics' office, Beaumont, Tex., burned Oct. 8, the loss being placed at $200,000.

The tipple, trestle and powder house of the Fort Ridge Coal & Coke Co., Middlesboro, Ky., were damaged by fire Oct. 8, the loss being placed at $50,000.

The warehouse of the Snow Wire Works, 76-78 Exchange Place, Rochester, N. Y., was damaged by fire Oct. 6, to the extent of about $2,500.

Fire at the plant of the Greater New York Metallic Bed Co., 251 South Second street, New York City, caused a loss to building and stock of approximately $50,000.

The loss on the plants of the Michigan Storage Battery Co., and Rathbone, Sard & Co., stove manufacturers, on Atwater street, Detroit, Mich., which were damaged by fire Oct. 10, is placed at $25,000.

The machine shop of Samuel Kauffman, Tipton, Ia., was damaged by fire Oct. 7. The loss is estimated at $4,000, with $2,000 insurance. It is planned to erect a concrete machine shop and garage to take its place.

Fire on Oct. 15 partly destroyed the plant of the Milwaukee Woven Wire Works, entailing a loss of more than $30,000, as estimated by President R. G. Marquardt. The building was 300 x 150 feet, two stories, and of frame construction.

The H. J. Frank Foundry Co., Davenport, Iowa, advises that the recent fire at its plant caused a delay in operations of only one day. The roof and walls around the cupola, however, were completely destroyed and had to be rebuilt. No damage occurred in other departments, and the loss of about $1,000 was completely covered by insurance.